VOL. XXIV. Nº 8. AUGUST 1939

MECCANO MAGAZINE

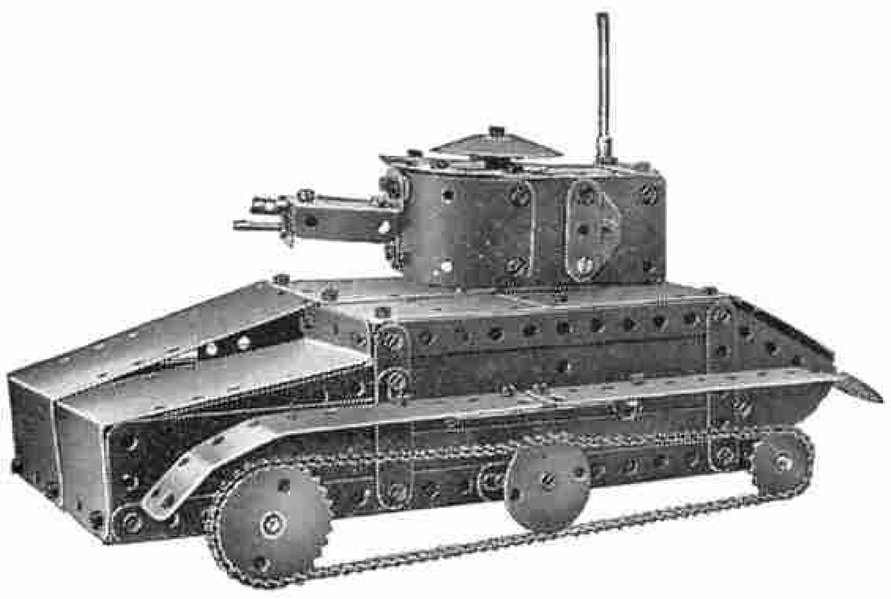
TRAINING A ROYAL AIR FORCE PILOT

6D.

MECCANO



The above illustration shows the new Meccano Mechanised Army Outfit. This consists of parts specially designed to construct models of the British Mechanised Army. The parts are enamelled in Service green and black and are interchangeable.



Typical Light Tank, with swivelling turret

MECHANISED ARMY OUTFIT

The rapid development of tanks, anti-aircraft guns, and mechanical transport of all kinds has revolutionised the Army of to-day.

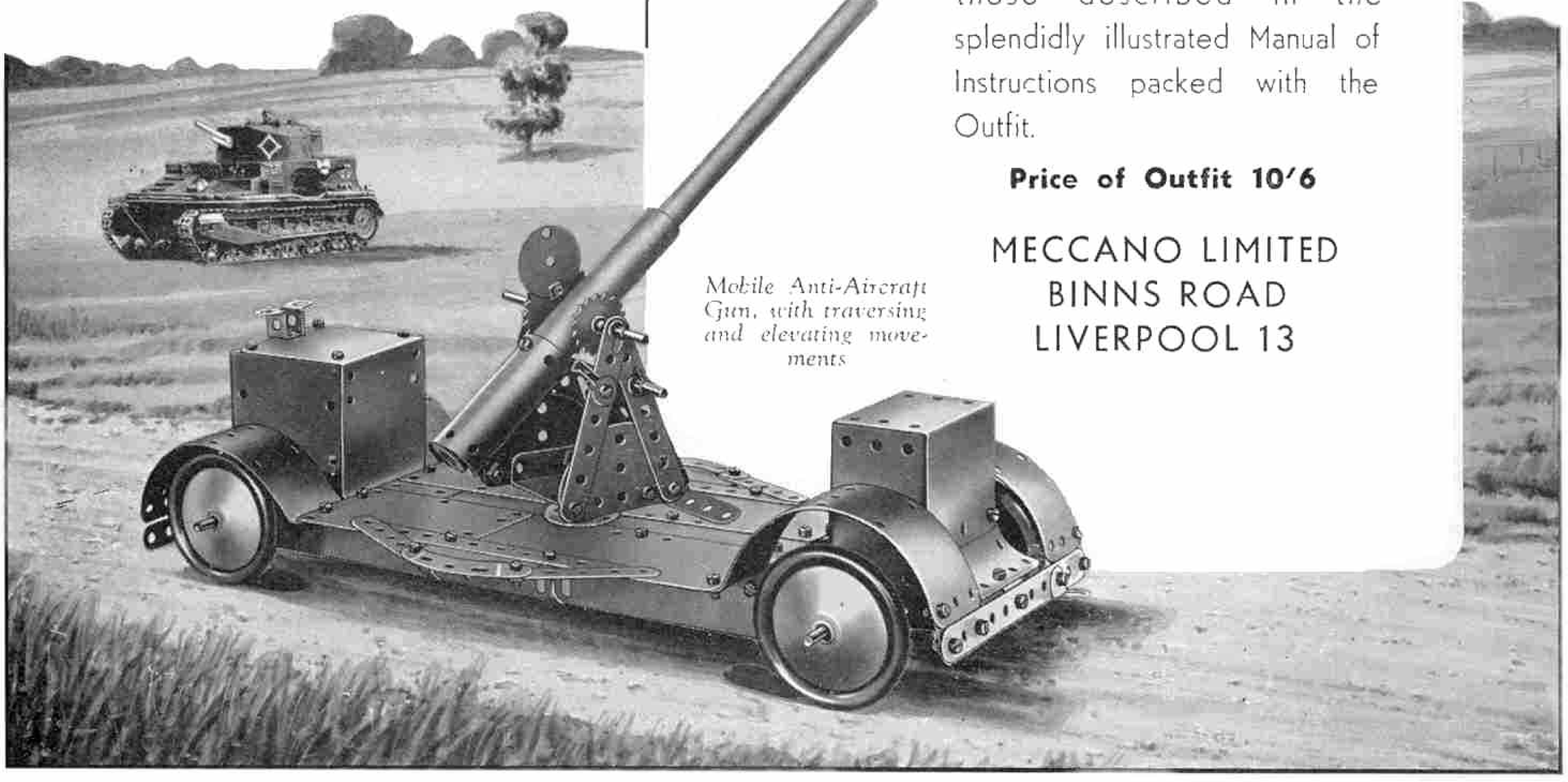
All boys are interested in the British Mechanised Units, and they will welcome the new Meccano Mechanised Army Outfit, with which can be built magnificent models of tanks, anti-aircraft and field guns, searchlights and transport vehicles, with a greater degree of realism than has ever before been possible.

The Outfit consists of a big assortment of specially designed parts, including Gun Barrels of different diameters, which can be used either singly or in combination.

The fine models shown in the accompanying illustrations are two of those described in the splendidly illustrated Manual of Instructions packed with the Outfit.

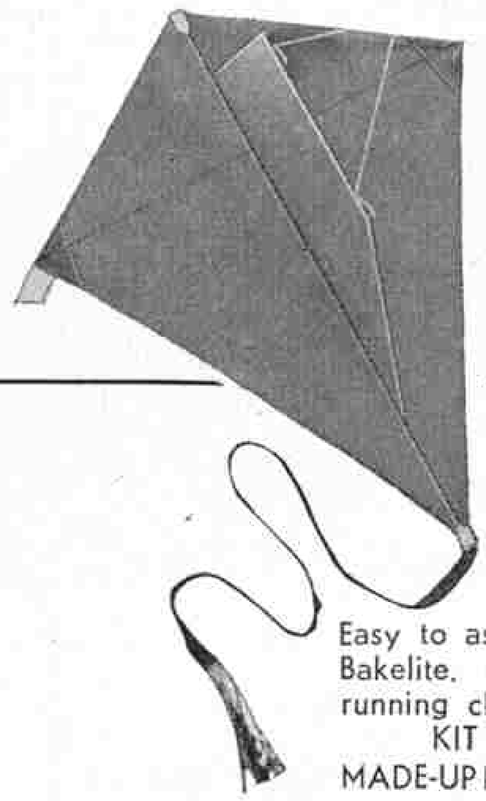
Price of Outfit 10'6

MECCANO LIMITED
BINNS ROAD
LIVERPOOL 13



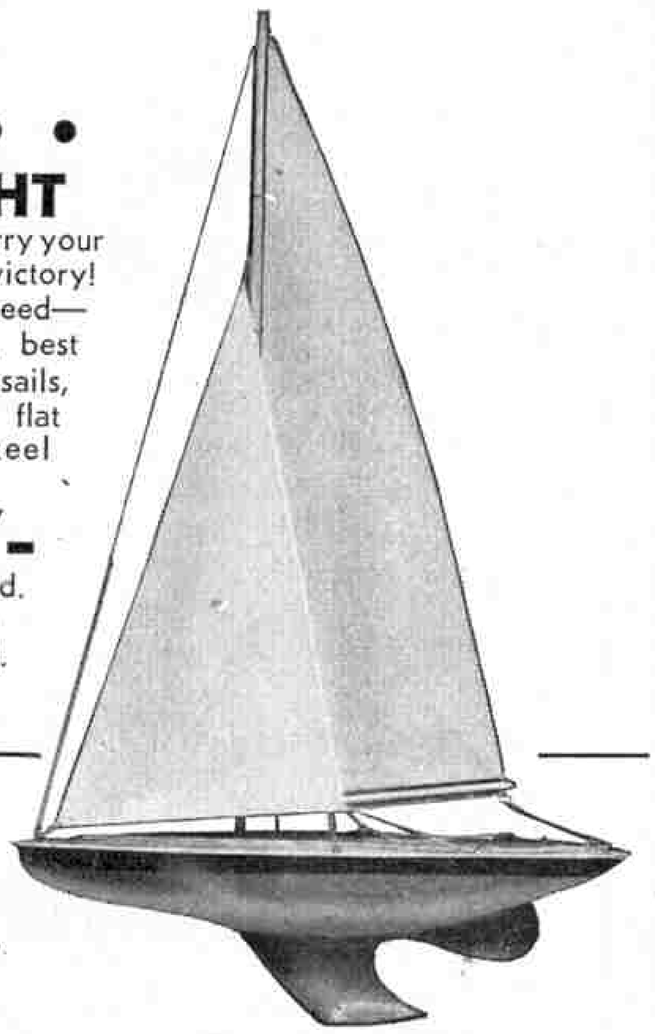
Mobile Anti-Aircraft Gun, with traversing and elevating movements

For WATER . . WIND . . and SKILL!

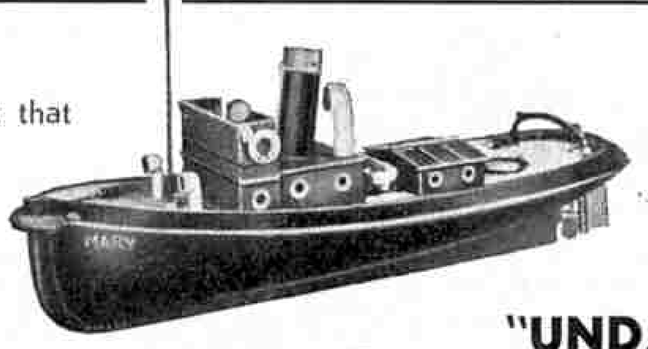


KITE. Here's a real high-flyer that's going to be very popular this year. Size 37" x 30". Sturdy but light-weight wooden frame that can be fitted into the strongly sewn corner pockets in a second. Strong fabric body, rudder and tail, reinforced at all the stress points—rolls up completely round frame struts.
Cord and Winder 1/- Price **2/6**
Postage 4d.

"K" YACHT
Here's a trim craft to carry your racing colours to victory! Strongly built for speed—24" **all-steel** hull, best quality masts and sails, automatic steering, flat bottom die-cast keel (useful for standing).
Price **15/-**
Postage 9d.
20" Hull, Price **7/6**
Postage 6d.
18" Hull, Price **4/11**
Postage 6d.



TUG-BOAT
Here's a fine, sturdy Tug-Boat that will do good work in any port. All parts cut to shape, including 7" moulded hull. Easy to assemble without tools. Made of Bakelite. Complete with strong, long-running clockwork motion.
KIT OF PARTS, PRICE **3/11**
MADE-UP MODEL, PRICE **7/6.** Postage 4d.





"UNDA-WUNDA" SUBMARINE
Re-arm your fleet with this compact little submarine. The 'Unda-Wunda' Submarine is fitted with a really reliable clockwork motor and is guaranteed to dive properly. A strong, stream-lined under-water vessel—hull length 8 inches.
PRICE **3/6** Postage 3d.

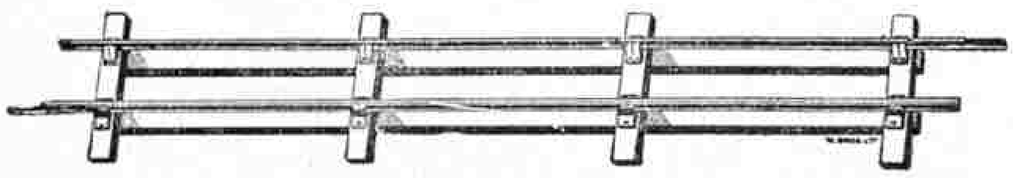
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What a thrill to have the Milbro "Garden Flyer" speeding up **your** garden! Why not extend your indoor track out-of-doors—now? Milbro Locos and Track parts are true-to-life replicas of the REAL thing, built with the precision and fidelity of detail of the great railway systems themselves. Now's the time to extend **your** track outdoors!

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ELECTRIC retails at 11½d. per length



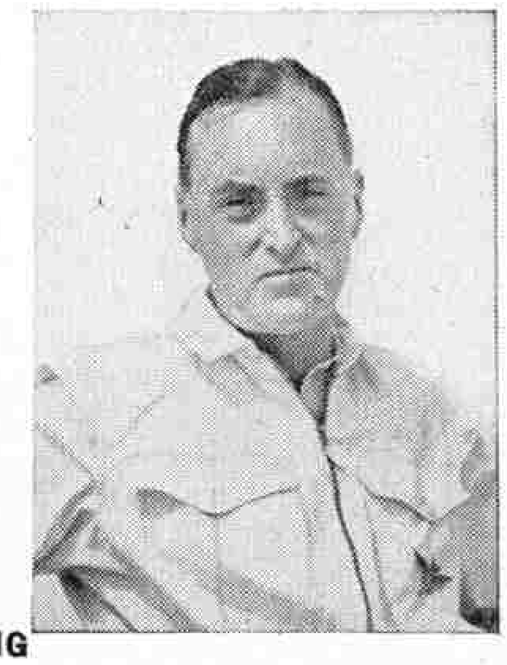
Send 6d. for your copy of the 100-page Catalogue describing the full range of Milbro Locos and Track parts.

MILBRO *TRUE-TO-SCALE replicas for reliability*

MILLS BROS. (Model Engineers) LTD., Dept. M.M., ST. MARY'S ROAD, SHEFFIELD.
London Showrooms: 2, Victoria Colonnade, Victoria House, Southampton Row, W.C.1.

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SIR MALCOLM CAMPBELL



Livelier acceleration—plus higher power and mileage—can always be obtained when pinking, either audible or *muffled*, is stopped by Esso Ethyl. Modern high-compression motors take full advantage of high-compression petrol, and in return give you all the power and performance the manufacturer built into them. Fill your tank with Esso Ethyl and give your car a chance to show how good it is.

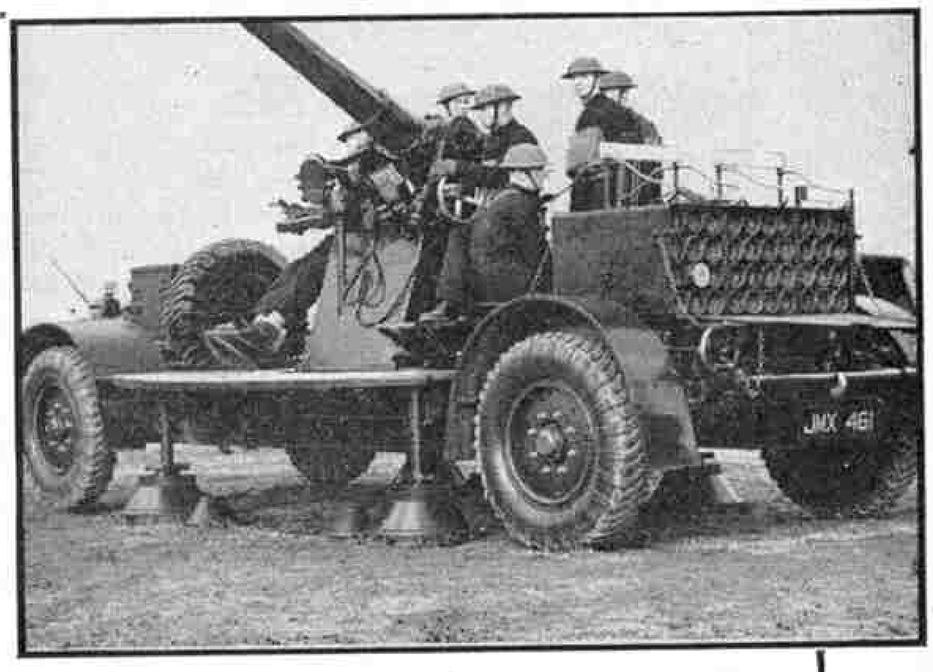
ESSO ETHYL—THE PETROL THAT STOPS MUFFLED PINKING

THE NEAREST THING TO FLYING

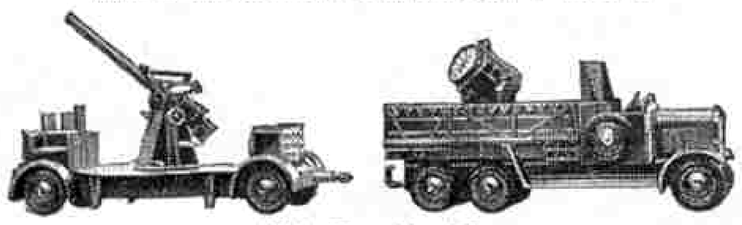
ESSO ETHYL

START COLLECTING DINKY TOYS PERFECT SCALE MODELS

Nowadays everybody is interested in the Mechanised Units of the British Army, and among the most popular Dinky Toys models are the two Royal Tank Corps Sets which have been great favourites since their introduction into the Dinky Toys range in 1937. They have recently been followed by an accurately modelled Mobile Anti-Aircraft Unit and an 18-pounder Quick-Firing Field Gun Unit which promise to have even greater popularity. Illustrations and full details of these fine miniatures appear below.



MOBILE ANTI-AIRCRAFT UNIT



Dinky Toys No. 161

Comprises scale models of a quick-firing anti-aircraft Gun mounted on a mobile platform and a Searchlight mounted on a lorry. Both Gun and Searchlight have elevating and traversing movements.
Price **3/-** per set

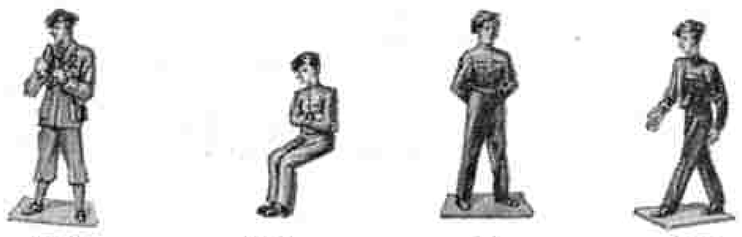
18-POUNDER QUICK-FIRING FIELD GUN UNIT



Dinky Toys No. 162

Comprises scale models of an 18-pounder Quick-Firing Field Gun, Trailer and "Light Dragon" Motor Tractor. Price **2/-** per set

ROYAL TANK CORPS PERSONNEL



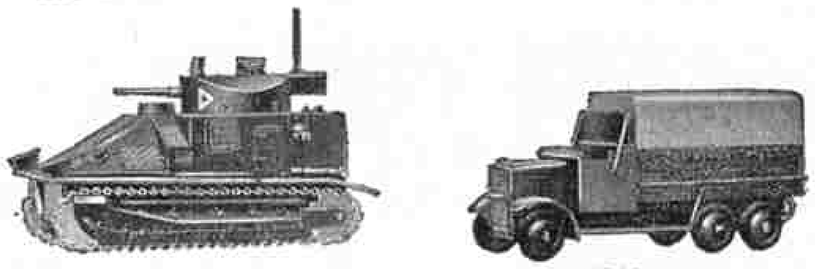
150a 150b 150c 150e

Dinky Toys No. 150

No. 150a	Officer	each	**3d.**
No. 150b	Private, sitting (two in set)	„	**3d.**
No. 150c	Private, standing (two in set)	„	**3d.**
No. 150e	N.C.O.	„	**3d.**

Price of complete set **1/6**

ROYAL TANK CORPS MEDIUM TANK SET



151A 151B



151D 150D 151C

Dinky Toys No. 151

No. 151a	Medium Tank	each	**1/6**
No. 151b	Transport Wagon	„	**1/1**
No. 151c	Cooker Trailer	„	**7d.**
No. 151d	Water Tank Trailer	„	**6d.**
No. 150d	Driver	„	**3d.**

Price of complete set **3/11**

ROYAL TANK CORPS LIGHT TANK SET



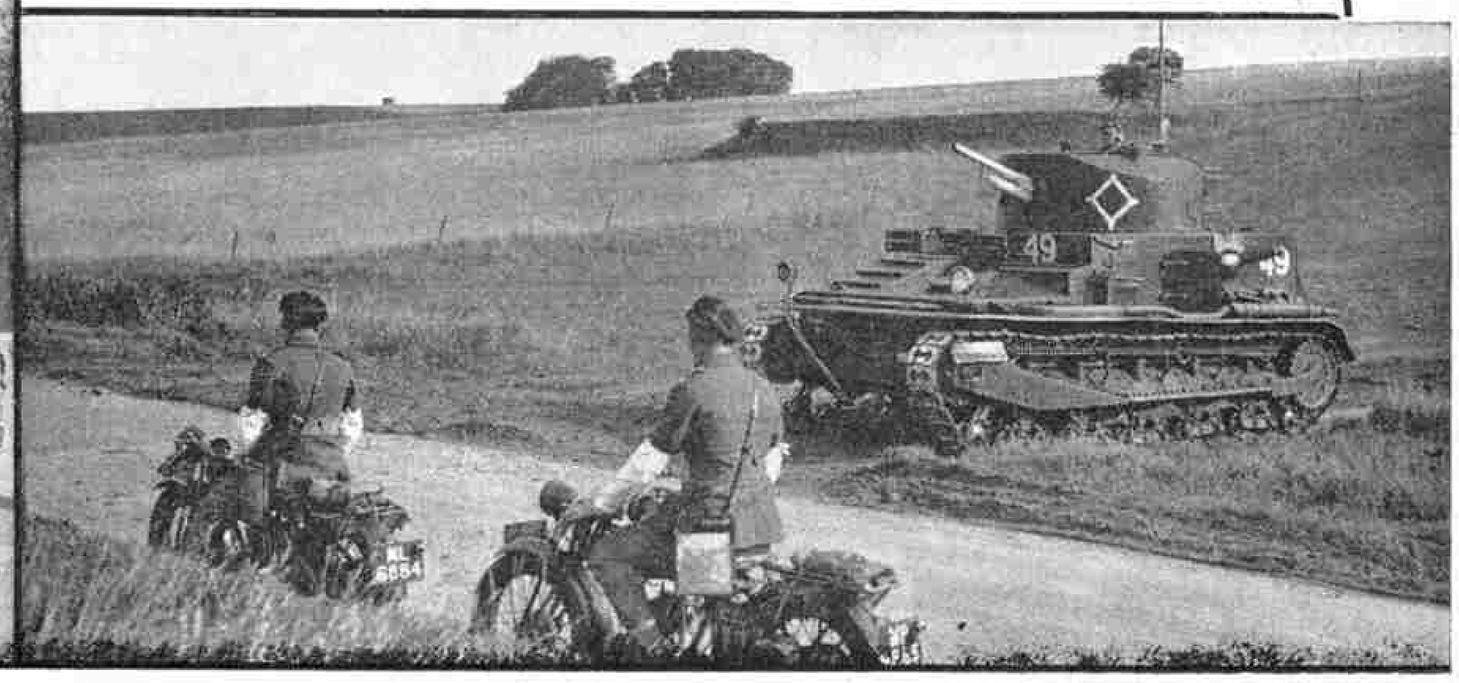
152a 150d 152b 152c

Dinky Toys No. 152

No. 152a	Light Tank ...	each	**1/2**
No. 152b	Reconnaissance Car	„	**1/-**
No. 152c	Austin Seven Car	each	**4d.**
No. 150d	Driver ...	„	**3d.**

Price of complete set **2/9**





A FASCINATING COLLECTING HOBBY

DINKY TOYS

OVER 300 VARIETIES

Collecting Dinky Toys is one of the most fascinating of all hobbies. These realistic miniatures are unique in their rich colouring and perfection of design and finish, and their range is so wide as to appeal to all tastes. This season many new items have been introduced including wonderful scale models of the latest types of Aeroplanes and Motor Cars, and many others.

Every boy or girl who has not already done so should start this delightful collecting hobby to-day. All the models can be purchased separately and most of them also in complete sets.

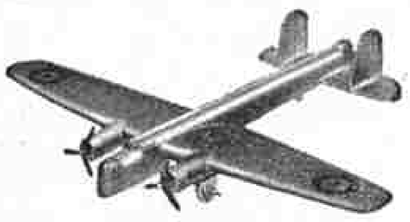
FAIREY "BATTLE" BOMBER



Dinky Toys No. 60n

Model of the Fairey "Battle" day bomber, a type much used by the R.A.F. It carries a pilot and gunner. Price **4½d.** each

ARMSTRONG WHITWORTH "WHITLEY" BOMBER



Dinky Toys No. 60v

Scale model of the "Whitley" long-range heavy bomber adopted by the R.A.F.

Price **9d.** each

ARMSTRONG WHITWORTH "WHITLEY" BOMBER (Camouflaged)

Dinky Toys No. 62t

Similar to Dinky Toys No. 60v but with Air Ministry Camouflage. Price **11d.** each

HAWKER "HURRICANE" SINGLE-SEATER FIGHTER (Aluminium Finish)



Dinky Toys No. 62s

Similar to Dinky Toys No. 62h, but with Aluminium finish. Price **6d.** each

HAWKER "HURRICANE" SINGLE-SEATER FIGHTER (Camouflaged)

Dinky Toys No. 62h

Scale model of the Hawker "Hurricane" Single-Seater Fighter extensively used by the R.A.F. Price **6d.** each

LOOK OUT FOR THESE!

BOEING "FLYING FORTRESS" MONOPLANE

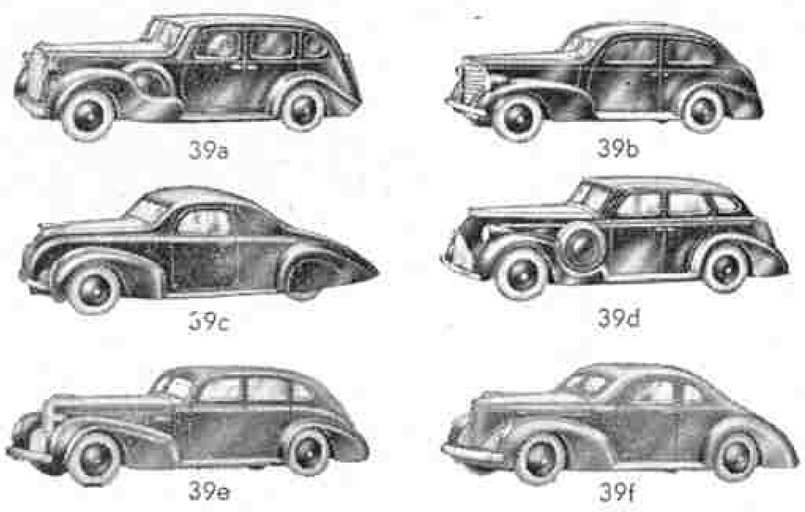


Dinky Toys No. 62g

Scale model of a famous American long-range bomber.

Price **1/2** each

SALOON CARS



Dinky Toys No. 39

Fitted with detachable rubber tyres.

No. 39a Packard "Super 8" Touring Sedan Car. Price **10d.** each

No. 39b Oldsmobile "Six" Sedan Car. „ **10d.** „

No. 39c Lincoln "Zephyr" Coupé ... „ **10d.** „

No. 39d Buick "Viceroy" Saloon Car. „ **10d.** „

No. 39e Chrysler "Royal" Sedan ... „ **10d.** „

No. 39f Studebaker "State Commander" Coupé ... ... „ **10d.** „

Price of complete set **5/-**

DOUGLAS DC-3 AIR LINER



Dinky Toys No. 60t

Scale model of the Douglas DC-3 air liner, which is in regular service on American and European routes. Price **9d.** each

ARMSTRONG WHITWORTH "ENSIGN" AIR LINER



Dinky Toys No. 62p

Scale model of the largest British air liner. Six models available, named *"Ensign," "Elsinore," "Explorer," "Echo," "Ettrick"* and *"Elysian."* Price **1/-** each

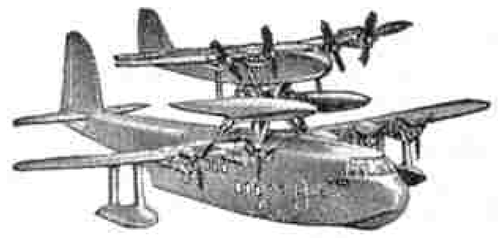
BRITISH 40-SEATER AIR LINER

Dinky Toys No. 62x

Similar in type to the Armstrong Whitworth "Ensign" air liner. Assorted colours.

Price **1/-** each

MAYO COMPOSITE AIRCRAFT



Dinky Toys No. 63

Scale model of the Mayo Composite Aircraft.

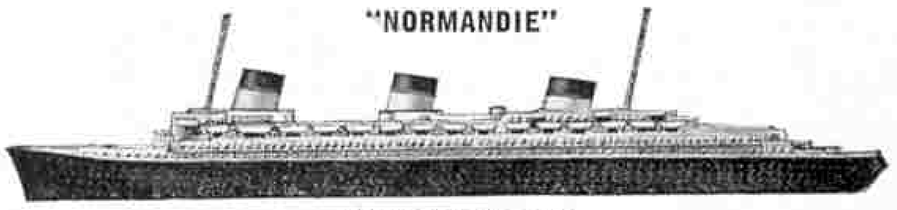
Price **2/-** each

The components of the above can be purchased separately.

No. 63a Flying Boat *"Maia"* ... **1/3** each

No. 63b Seaplane *"Mercury"* ... **9d.** each

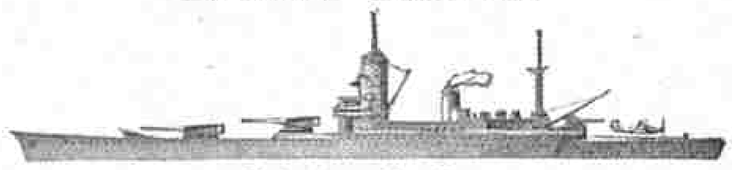
"NORMANDIE"



Dinky Toys No. 52c

A scale model of the French Line's giant steamship. (Made in the Meccano Factory in Paris.) Price **1/6** each

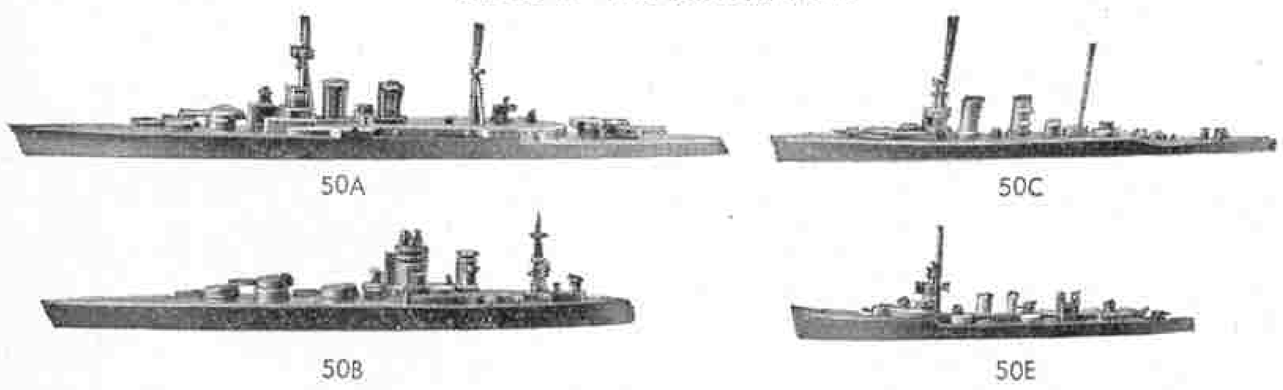
BATTLESHIP "DUNKERQUE"



Dinky Toys No. 53az

Scale model of the French 26,500 ton Battleship "Dunkerque," which has an overall length of 702 ft. 9 in., and a main armament of eight 13 in. guns. (Made in the Meccano Factory in Paris.) Price **9d.** each

SHIPS OF THE BRITISH NAVY



Dinky Toys No. 50

No. 50a Battle Cruiser "Hood" ... ... each **9d.**

No. 50b Battleships, "Nelson" Class (2) „ **6d.**

No. 50c Cruiser "Effingham" ... ... „ **4d.**

No. 50d Cruiser "York" ... ... „ **4d.**

No. 50e Cruiser "Delhi" ... ... „ **4d.**

No. 50f Destroyers, "Broke" Class (3) ... each **1d.**

No. 50g Submarine, "K" Class ... ... „ **1d.**

No. 50h Destroyers, "Amazon" Class (3) „ **1d.**

No. 50k Submarine, "X" Class ... ... „ **1d.**

Price of complete set **3/6**

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Where are the "Q planes"?

The latest in glider models. They are exact replicas of the aeroplanes used in the film and are sold in kit form. And how they fly. The cut out and moulded parts can be put together in a few hours. Take the thrills of the film story home with you. Your local aeroplane stockist has the kit and it costs only **2'6**

HERE ARE SOME MORE ASTOUNDING PERFORMERS

THE FROG SAILPLANE

A ready built glider which can be launched by hand or by catapult. It is very strongly built with cambered wing surfaces, and is an imposing sight in full flight. Span 28 ins. Price **5'-**

20K THE VICKERS WELLESLEY

A flying scale-model kit. Easy to build. Parts are stamped out and cement, tissue, paint, elastic and full instructions are included. Hours of fun to build and to fly. Price **2'6**

YOU'LL FIND THEM AT YOUR LOCAL AEROPLANE SHOP

FROG

MODEL AIRCRAFT

Covered by World Patents granted and pending.
Made in England by International Model Aircraft Ltd.

FROG Trade Mark Regd.

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MORDEN RD., S.W.19



Own a *real* MOTOR CAR of your own!

The ATCO JUNIOR Safetyfirst TRAINER

- ★2-seater open sports body
- ★1 h.p. petrol driven engine
- ★Real gear-lever for forward, neutral and reverse. Accelerator pedal and foot and hand brakes

Show this to your Father

If every car owner to-day had been driving since the age of six, road sense and quick reflex would long ago have become instinctive. Result—a nation of skilled and safe drivers. Let your children have the advantage you could not have. Buy them this Trainer. It is perfectly safe and is a Trainer, not a toy. They will enjoy learning. You yourself can drive it and teach them. It will be money well spent because they will be truly "veteran" motorists long before they go on the road.

This is a national cause, the building of a nation of safe drivers and well-grounded, practical "mechanics" for a mechanised era. Use your influence with the Head Master of the Preparatory School. EVERY child should have this training. Be among the first to recognize the need of youth-training recommended by the Lords' Select Committee on Road Accidents. Why not arrange a demonstration in your garden?

Learn how to drive in your garden. Become a "veteran" driver long before you have to take the test. The Atco Trainer can be driven in narrow paths. You'll soon be an expert. A 68-page Manual of Instruction tells you how a petrol engine works. In this mechanical age a fellow can't start too early to become "machine-minded."

Write for fully-illustrated catalogue to the originators and sole makers: Charles H. Pugh Ltd., Whitworth Works, Birmingham 9.

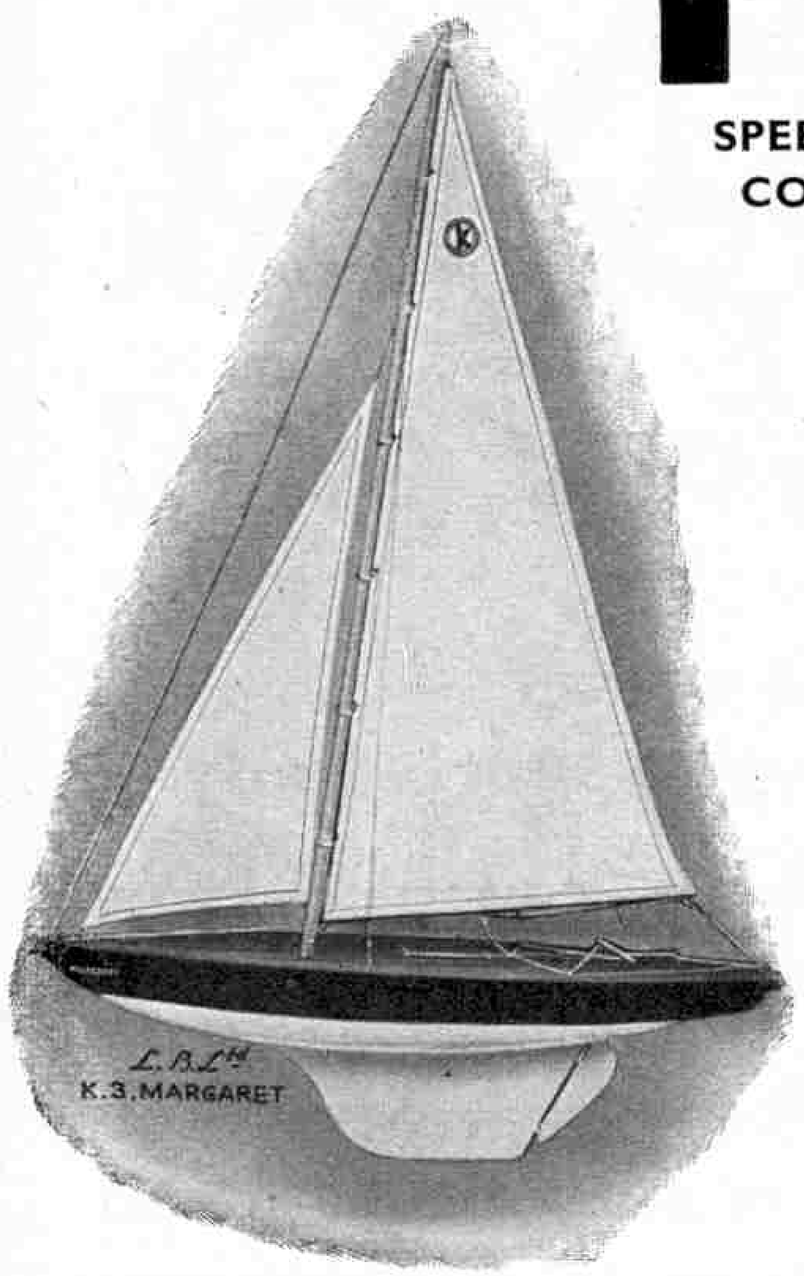
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SPEED BOATS, ELECTRIC CABIN CRUISERS
COASTAL STEAMERS, FISHING SMACKS
CLOCKWORK STEAM DRIFTERS
AND

YACHTS



"K" YACHT "MARGARET"

Magnificent craft with AUTOMATIC STEERING. Patent light-weight weather resisting hull. Solid mahogany polished deck. Mast and boom made from finest selected material, best quality sails, fully adjustable. Beautifully finished in blue and white. Length of hull, 26 in. **Price 21/-**



CLOCKWORK STEAM DRIFTER

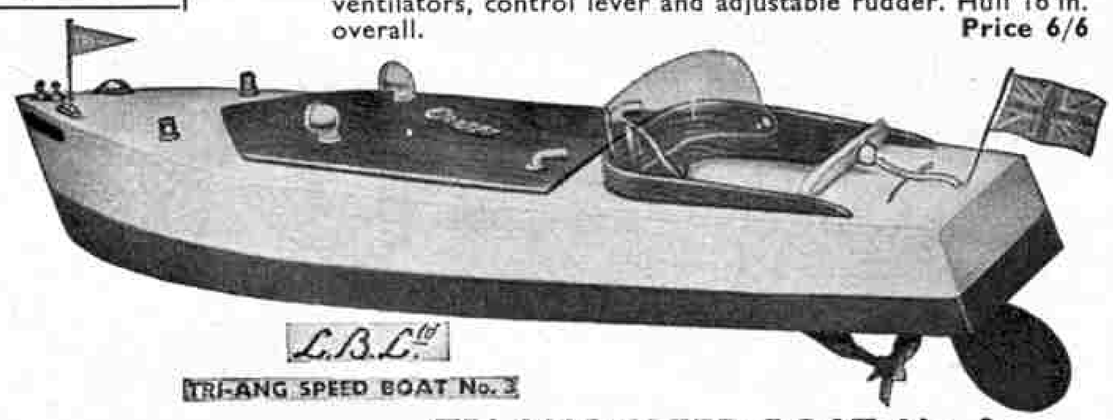
Realistic model with strong, long running clockwork mechanism, adjustable mizzen sail and rudder, dummy ventilators, etc. Length of hull, 16½ ins. **Price 17/6**

NEW ! !
Tugboat Construction Kit
Price 3/11.
No Tools. All Parts to Shape.
Clockwork Motor included.



K SPEED BOAT No. 1

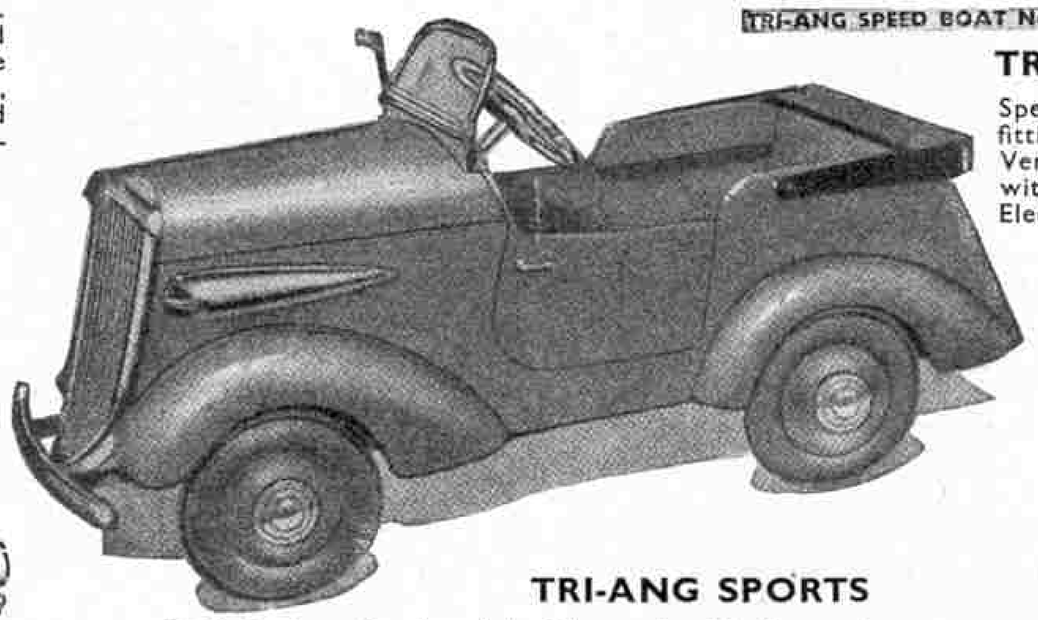
Fitted with powerful mechanism, windscreen, dummy ventilators, control lever and adjustable rudder. Hull 16 in. overall. **Price 6/6**



TRI-ANG SPEED BOAT No. 3

Specially designed hull with mahogany deck, brass fittings, ventilators and detachable motor cover. Very powerful clockwork mechanism. Complete with bow pennant and stern flag. Hull 20½ in. overall. Electric Motor 22/6. **Price 21/-**

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Realistic streamlined model, with opening side door and luggage boot. 8 in. balloon disc wheels. ¼ in. rubber tyres. Ball-bearing back axle. Plated bumper and streamline dummy side lamps. Windscreen, direction indicator and dummy hood. Length 41 in. **Price 39/6**

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"FAIRYCYCLE" (Regd.) MODEL No. 2

Cycle tubular frame and forks. 14 in. wheels. 1⅜ in. jointless sponge-rubber tyres. Ball-bearing pedals. Roller lever brake. Two-coil saddle. Chain cover. Stand. CHROMIUM-PLATED FITTINGS. Black, blue or maroon. **Price 39/6**

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BROS.
ENGLAND

TRI-ANG



TRI-ANG TRICYCLE No. 5B (Regd. Trade Mark)

Cycle chain drive with free-wheel. Ball-bearings throughout. Frame and forks best quality weldless cycle tubing. 16 in. front and rear wheels. 1⅜ in. jointless sponge-rubber tyres. Roller lever brake. Coil spring saddle. CHROMIUM FITTINGS. Black, blue or maroon. **Price 59/6**

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NEXT MONTH: "HOW THE C.P.R. GETS ITS SLEEPERS." PUBLISHING DATE: 1st SEPTEMBER

MECCANO MAGAZINE

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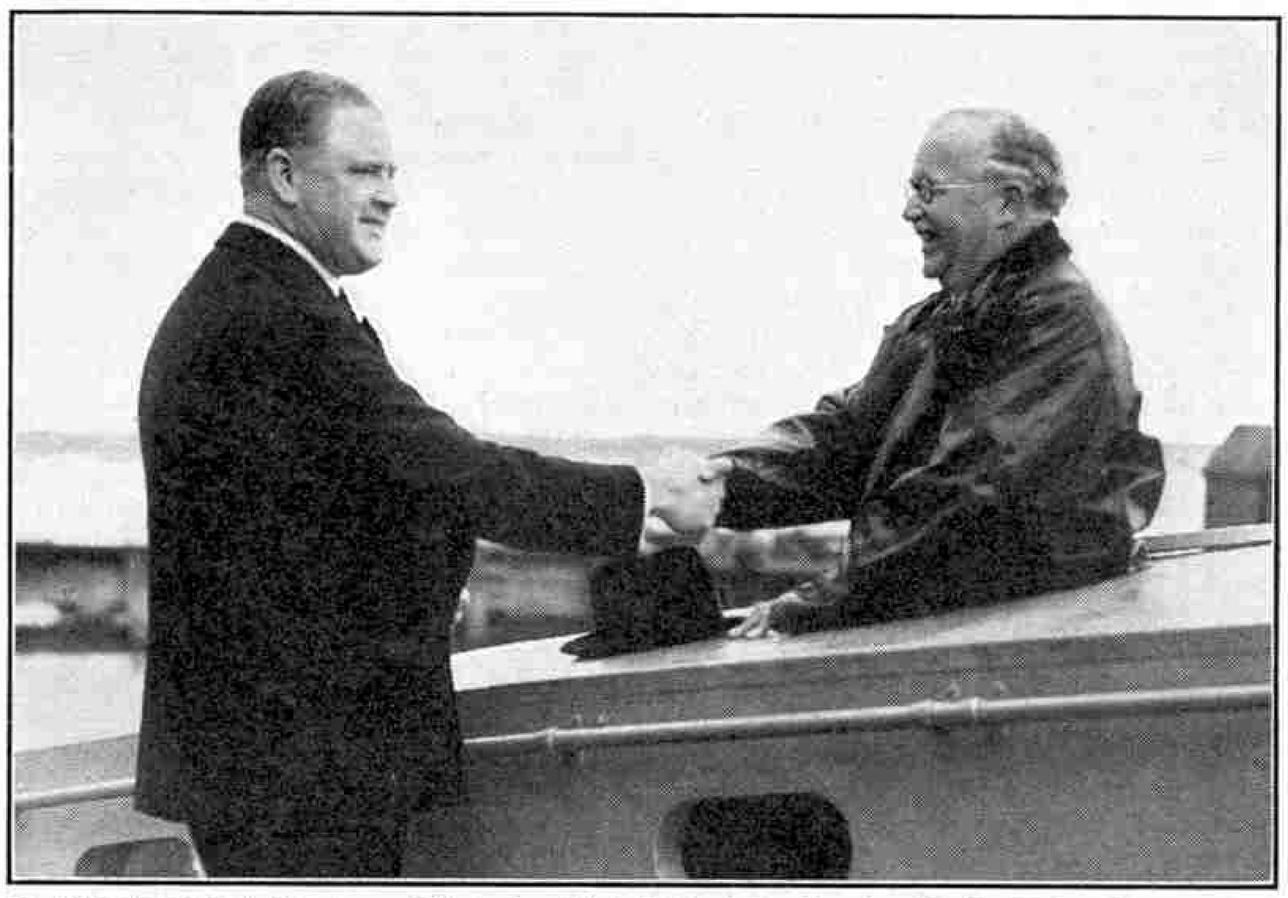
Vol. XXIV. No. 8
August 1939

With the Editor

The New Style of the "M.M."

All my readers will have noticed the changes in the layout and style of the pages of the "*M.M.*" that commenced in the May issue. The main object of these changes was to give variety to the pages and to brighten and improve their general appearance. Within two or three days of the appearance of the May issue letters began to come in from readers expressing enthusiastic approval of the new style, and since then almost every post has brought further messages of congratulation.

This chorus of approval, coupled with the striking fact that I have not received even one letter expressing an unfavourable opinion, provides, I think, unmistakable proof that readers like the "*M.M.*" better in its new form. At the same time some readers made suggestions for further changes, which I am now carefully considering. Before coming to a definite decision, however, I should like to have more suggestions; and I want every reader who has any ideas in regard to the general improvement of the style of the "*M.M.*" to write to me expressing his views. I shall be glad to receive these letters as early as possible, so that any changes that are decided on may be incorporated in the Autumn issues.



Sir Kingsley Wood, Secretary of State for Air (right), shakes hands with Mr. Hubert Scott-Paine, the famous motor boat designer and Chairman and Managing Director of the British Power Boat Co. Ltd. (See page 474.)

Words!

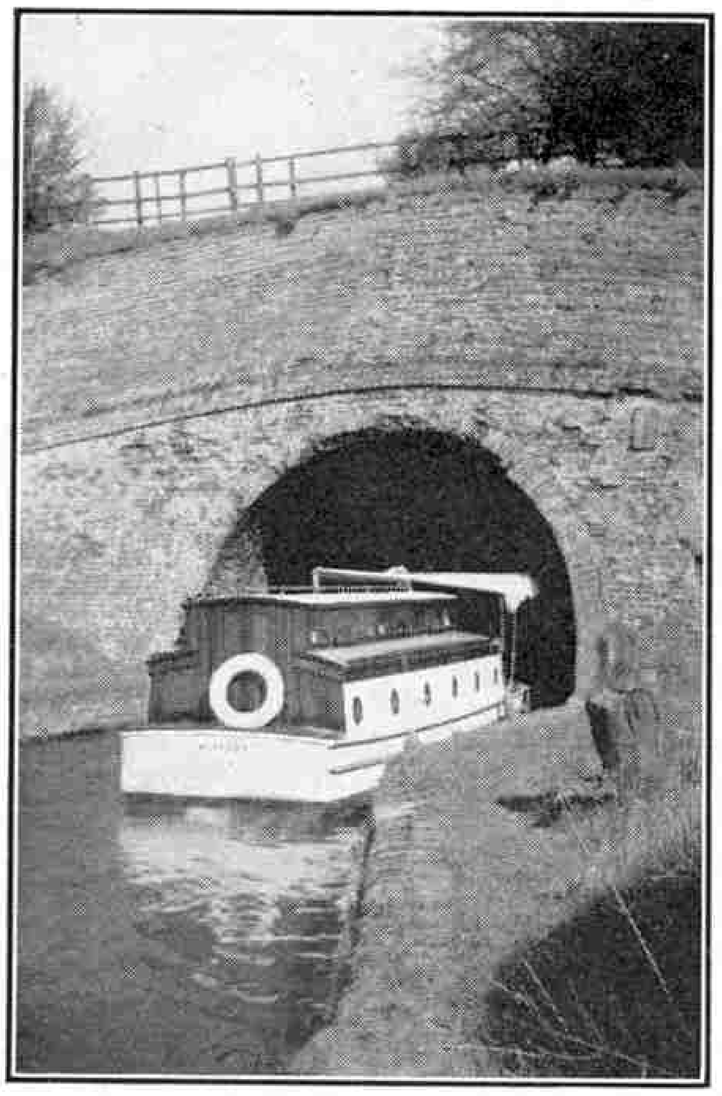
One of my most interesting editorial "sidelines" is that of settling arguments for readers. The majority of the problems submitted are straightforward, but every now and then one crops up that fairly stumps me and my staff, and demands frantic searching of books and the worrying of innocent librarians. Just recently I received an urgent enquiry as to which is the longest word in the English language. Now this query turned up some years ago, and my efforts to deal with it then resulted in a perfect deluge of words from readers young and readers old. Remembering this outburst, I refuse to attempt to decide which is the longest word. I will only say that "antiinterdenominationalistically" with 32 letters, and "antidisestablishmentarianistically" with 34 letters, must be well in the running. Of course there are longer place names, and extremely long words can be built up by placing a collection of words end to end. "*Dixon's Paper Circular*" for July gives a good word of this type, alleged to come from Sweden. It is: "Sparvägsaktiebolagsskensmutsskjutarefackföreningspersonalbeklädnadsmagasinsförradsförvaltaren." We are told that its 93 letters can easily be pronounced by a Swede in one breath!

When all is said and done, it would be hard to beat the word "smiles," which has one thousand seven hundred and sixty yards between its first and last letters!

Prizes for Holiday Yarns

By the time this issue of the "*M.M.*" reaches them, readers will be on holiday and enjoying the change from ordinary routine. Even the most ordinary type of holiday generally produces something of special interest, an exciting incident, or an amusing situation; and to brighten up things generally I am offering special prizes for the best descriptions of: "*The Most Interesting or Amusing Thing I Saw or Did During my Holiday.*" For the three best descriptions I offer prizes of £1/1/–, 15/– and 10/6 respectively. Each entry is limited to 200 words. This is not a stodgy essay competition, and no bad marks will be given for poor writing—so long as it can just be read!—or for an occasional letter or punctuation mark that goes astray. The yarn is the thing.

Entries to this competition must be addressed: "*Editor's Yarn Contest*, Meccano Magazine, Binns Road, Liverpool 13." They must be posted in time to reach me not later than 16th September.



Entering the mile long tunnel at Braunston.

Motor Boat Cruising on Inland Waterways

By Garry Hogg

THERE are still parts of England, by no means off the beaten track, that remain to be explored, cross-country routes that no motorist, cyclist or hiker has ever taken. They are to be found along our navigable rivers and canals. This was brought home to the writer during a recent fortnight's cruise over 250 miles of such waterways, through country which he certainly thought he already knew from driving and walking in it.

Quite apart from the well-known Norfolk Broads, there are some hundreds of miles of navigable water in England. The Thames, for instance, is navigable for well over 100 miles above London; there are about 100 miles of good water along the Severn and the Avon, and 70 miles on the Wye. The Trent and the Ouse also have long stretches, and in addition there are the canals, such as the Grand Union, the Oxford, and the Kennet and Avon.

Our cruise began at Oxford. For a little over 50 miles we followed the narrow Oxford Canal as it wound its way east by north towards its junction with the Grand Union at Braunston, almost under the shadow of the wireless masts at Daventry. We then followed the Grand Union Canal for nearly 100 miles, south-east to its junction with the Thames at Brentford, and returned to Oxford up the 100 miles of the Thames.

The craft used was a 30-ft. cabin-cruiser of 7-ft. beam, drawing rather less than two feet. It was powered by a 12-24 h.p. Morris "Navigator" engine, which proved to have plenty of reserve for the long stretches of the Thames that we had to cover against both current and a head-wind. The boat slept six in comfort, two on spring-mattresses in the cabin aft, two in the cabin amidships, and two more on the long padded seats between the cabins and the foredeck. An awning fitted with water-proof side-curtains completely enclosed the cockpit if necessary, so that the two members of the crew, A.B.'s 11 and 13 years old respectively, who occupied the outside berths, slept as snugly as those in the cabins, wet or fine.

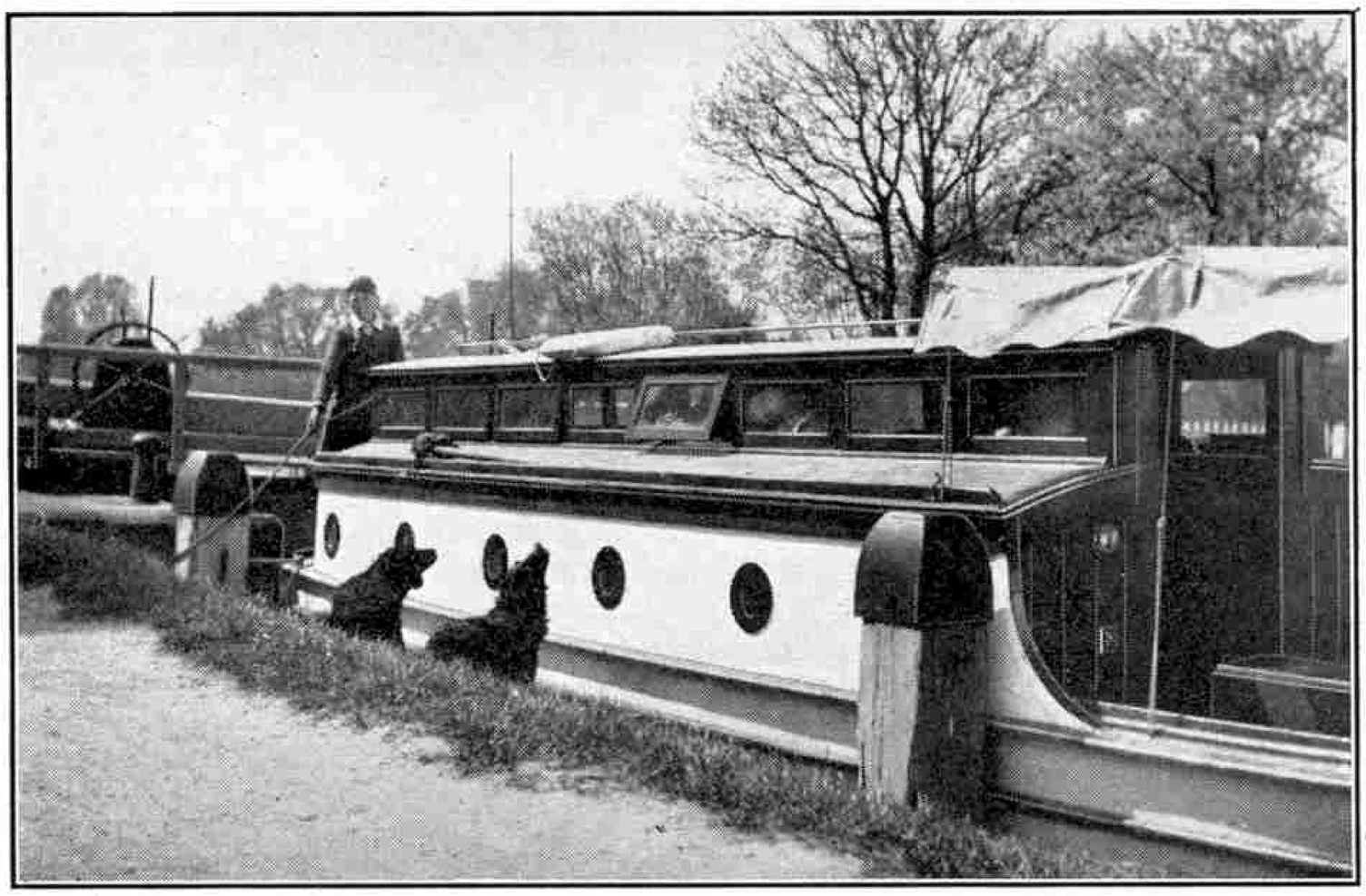
Craft of this sort may be hired from specialists in inland cruising. They are completely equipped, from blankets and pillows down to tin-openers and pepper-pot. The galley is compact, but large enough for three meals a day to be cooked for a hungry crew; and a large-capacity battery holds a fine reserve to meet the demands of the bunk-head lights and navigation lamps, as well as the self-starter on the engine.

We thought first of setting off down-stream, with the idea of saving a little petrol by making use of the current, but finally went in the opposite direction, up the Oxford Canal, perhaps with a secret feeling that we should like to gain our first experience of lock work on a canal that was small and not too thickly populated by experienced bargemen. It proved in the end a wise decision. Except on the Thames all locks must be operated by the crews of boats using them, a special lock-key being supplied for the purpose. Their manipulation appears very easy when one watches the bargemen passing through them, but it is surprising how many small factors have to be borne in mind by the novice. For instance, it is so easy to omit to close the sluices, technically known as "paddles," after swinging-to the lock gates behind one's boat, for this has sometimes been done and sometimes omitted by craft going on ahead. The result of such an omission of course is that the lock empties as fast as it fills through the top gate paddles!

The locks are numerous. In the 54 miles of the Oxford Canal there are 40, though here the gates are single and therefore relatively easy to handle, since the locks are only 7 ft. in width. On the Grand Union Canal there are nearly 100 locks in as many miles, however, and all will take two craft of 7-ft. beam at once. Paddles are heavy to wind up, and a stout pair of shoulders must be laid against the "balance," as the great beam is called that gives leverage on each lock gate. It is interesting to note that the upper gates of most Grand Union Canal locks have two sets of paddles. One set allows water to flow in from the floor itself of the lock, instead of from the gate. This is so that a heavily-laden barge will be helped to lift itself in shallow water, and prevented from grounding as the water surges to and fro.

Lock work is strenuous, but the tendency is for locks to occur in batches of three, four or five at intervals in the longer stretches of open water, which makes it possible to send a "shore party" on in advance along the tow-path to prepare them before settling down to a laze on the cushioned seats. Bargemen have reduced lock work to a fine art. They do not waste time or energy. The towing-barge noses the gates open, and the "butty" towed astern edges her way in alongside with only an inch or two to spare. Meanwhile the barge-man's wife, at the tiller of the butty, has thrown a short stout rope up and over a post on the lock gate. The momentum on her craft is just sufficient to pull the gate to behind her, while the inertia of the gate is just sufficient to prevent the butty from fouling the top gate before she comes to a standstill. We never tired of watching this manœuvre, but our craft was too light for us to try to imitate it.

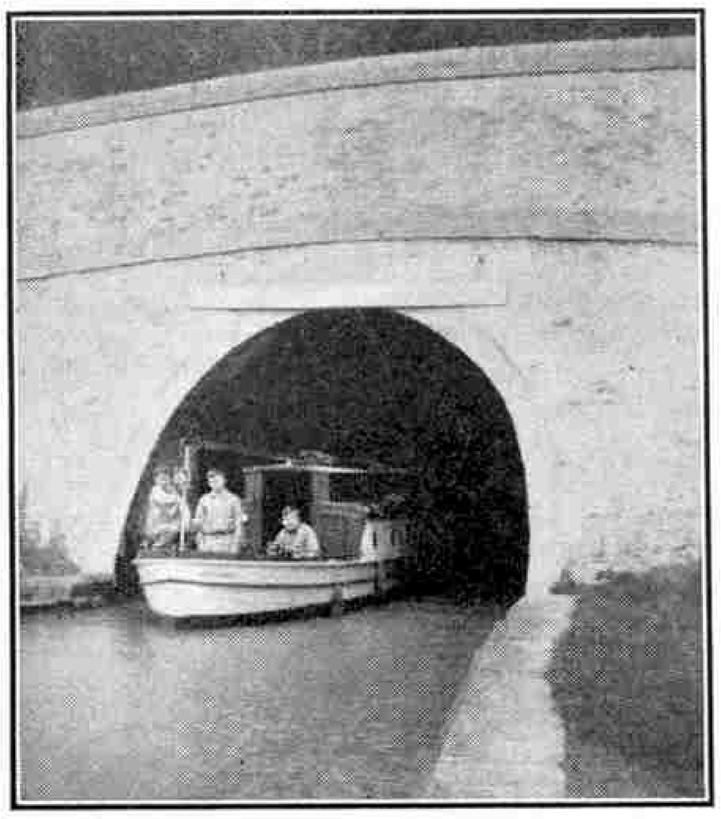
The rule of the river and canal is to keep to starboard, passing "port to port," but this rule must always be broken when meeting one of the few remaining horse-



Lock work during the cruise.

drawn barges, which have priority everywhere over mechanically-propelled craft. This must be remembered particularly when mooring at night. A boat must be made fast on the side opposite to the towpath, for the bargeman starts early in the morning, some, indeed, working through the night. Here, if it were needed, is refutation of the old accusation that your bargeman is an ill-spoken fellow. He is as courteous on the canal as his brother at the wheel of the lorry on the road. Never once did a bargeman fail to slow down his engine in passing us when we were moored to the bank, so that we felt as little as possible of his wash.

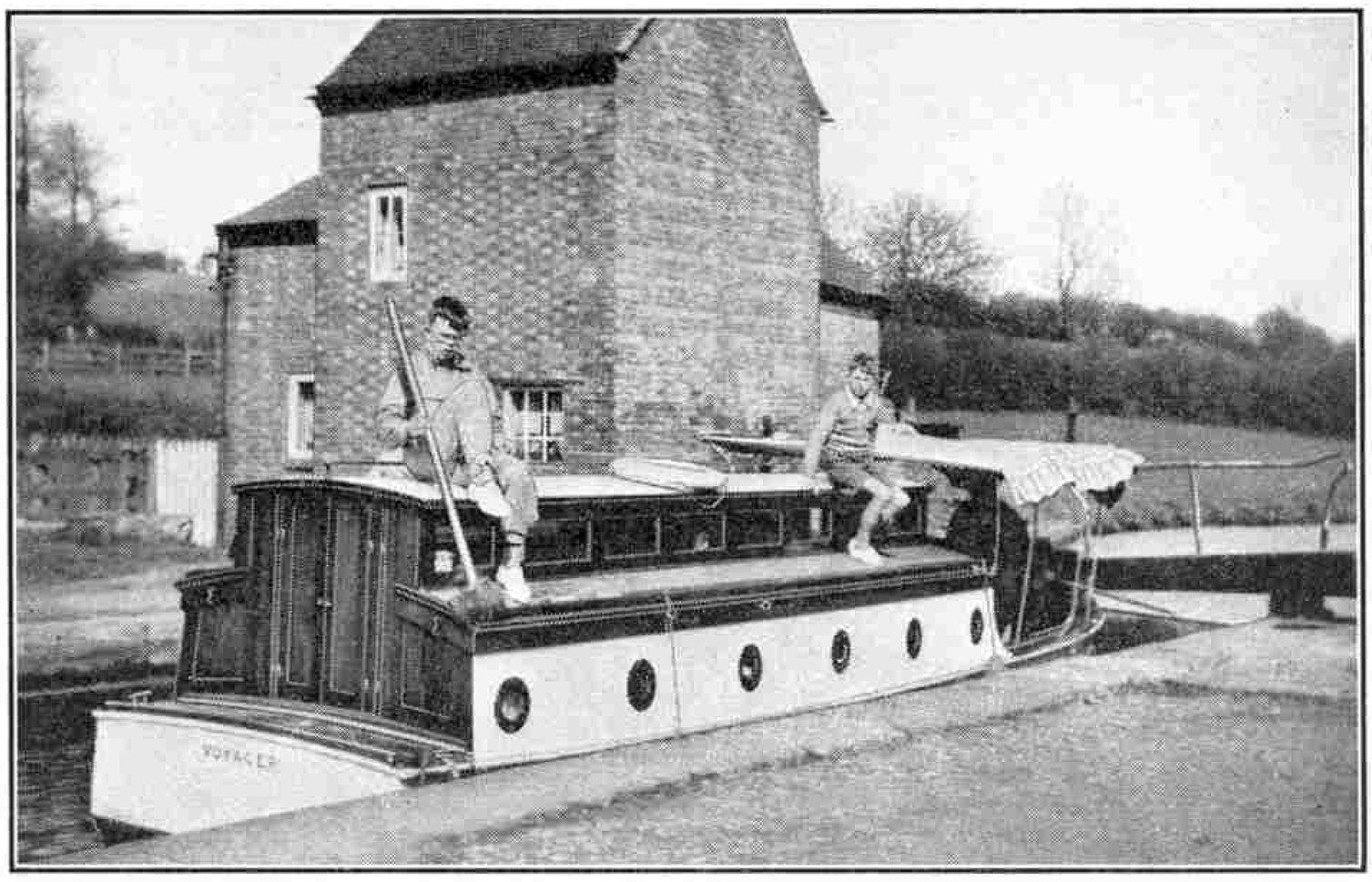
It is a good thing to carry a map of the route to be covered, preferably the one-inch Ordnance Survey. Not only does this add interest, but it enables one to avoid running short of supplies. Unlike the roads, canals are not signposted. Petrol-stations do not line their banks, and they miss most villages and towns unless there is some industrial centre connected with them, like the timber-wharves at Uxbridge. It is specially easy to run short of milk, which as a general rule can now no longer be bought at the first farm you come to. Intelligent use of a map enables one to plan foraging-parties well ahead. The larder is necessarily small, and it is difficult to carry on board



Into daylight once more. The "Voyager" emerging from Blisworth tunnel.

supplies for six people to last more than one day ahead. Water for drinking and cooking is a similar problem, and it is a wise plan to fill up the tanks when passing a cottage reasonably near the canal. Four or five gallons of drinking water are needed every day, on an average. Canal water is good enough for washing and washing-up.

Mooring-spikes as well as lock-keys are supplied with the boat, and a last look should be taken at these before turning in, for most canal-banks are very soft, and the wash set up by even a slow-moving barge, which carries 20 tons of cargo and tows 25 tons in the butty, is enough to work the spikes loose if they have not been well secured. It is advisable to choose as deep water as possible. Mooring in shallow water may well lead to mud being sucked into a filter of the engine cooling system, the result of which will be trouble with overheating next day. Weed also may get wrapped round the propeller. If this happens the best plan is to drift into deep water and then go hard astern for a few seconds; this will invariably get rid of the weed.



The "crew" of the "Voyager" have a spell while in a lock. This photograph gives a good idea of the size of the cabin-cruiser in which the trip described in this article was made.

As we expected, we found the Thames a good deal more picturesque than the canals, but it certainly has not their fascination. For one thing all the Thames locks are operated by the lock-keepers, so that you no longer have the feeling that you are personally responsible for the progress of your boat. The rush of water in these great locks is tremendous and it is imperative to make fast to the bollards both fore and aft, and to keep a member of the crew at each rope to haul in the slack as the water rises. Manœuvring below these locks is tricky, too, for on the Thames there is usually a weir alongside, and you must make fast to a post or a ring-bolt while the lower gates are being opened. The locks are far less numerous on the river than on the canals, averaging one in three miles or so from London to Oxford.

Perhaps the most exciting experience in the whole cruise was the navigation of the two-mile tunnel near Blisworth. The tunnel is unlit from end to end, but straight as a die, and at intervals there are ventilation chimneys, down which a stream of ice-cold water seems to fall everlastingly. Passing a barge in the tunnel is a breath-taking event. There is not more than six inches to spare between your boat and the long lean monster with its brilliant headlamp. With motors throttled down to idling speed we drifted past like ghosts, and in the long tunnel picked up the echoes of each other's exhausts as each put on speed once more.

Locks were always more or less exciting. Considering that we passed through more than 160 from first to last, it is astonishing that not one member of our crew fell in. We carried a lifebelt, but never had a chance to use it. A mooring-spike went overboard, but a lock-keeper grappled for it with a long-handled hook. Such little episodes all add to the interest of an inland cruise.

Three members of the crew had had experience of driving, but not one of us had ever steered a motor boat. The first thing we discovered was that, whereas a car's steering wheel brings her nose round to left or to right, on a motor boat it is the stern that swings. The result of this is that, unless one is very careful, the stern of the boat is liable to swing heavily against the bank or a lock gate instead of moving in the direction chosen. The first indication we had of this was when the cook called out from the galley aft to say that a frying pan full of sausages had been jerked off the Primus on to the floor! With this excellent illustration as a guide we learned our lesson very quickly. It is also practically impossible to steer when going astern, and it is a little disconcerting to find that when in charge of a boat, there are no brakes to rely upon!

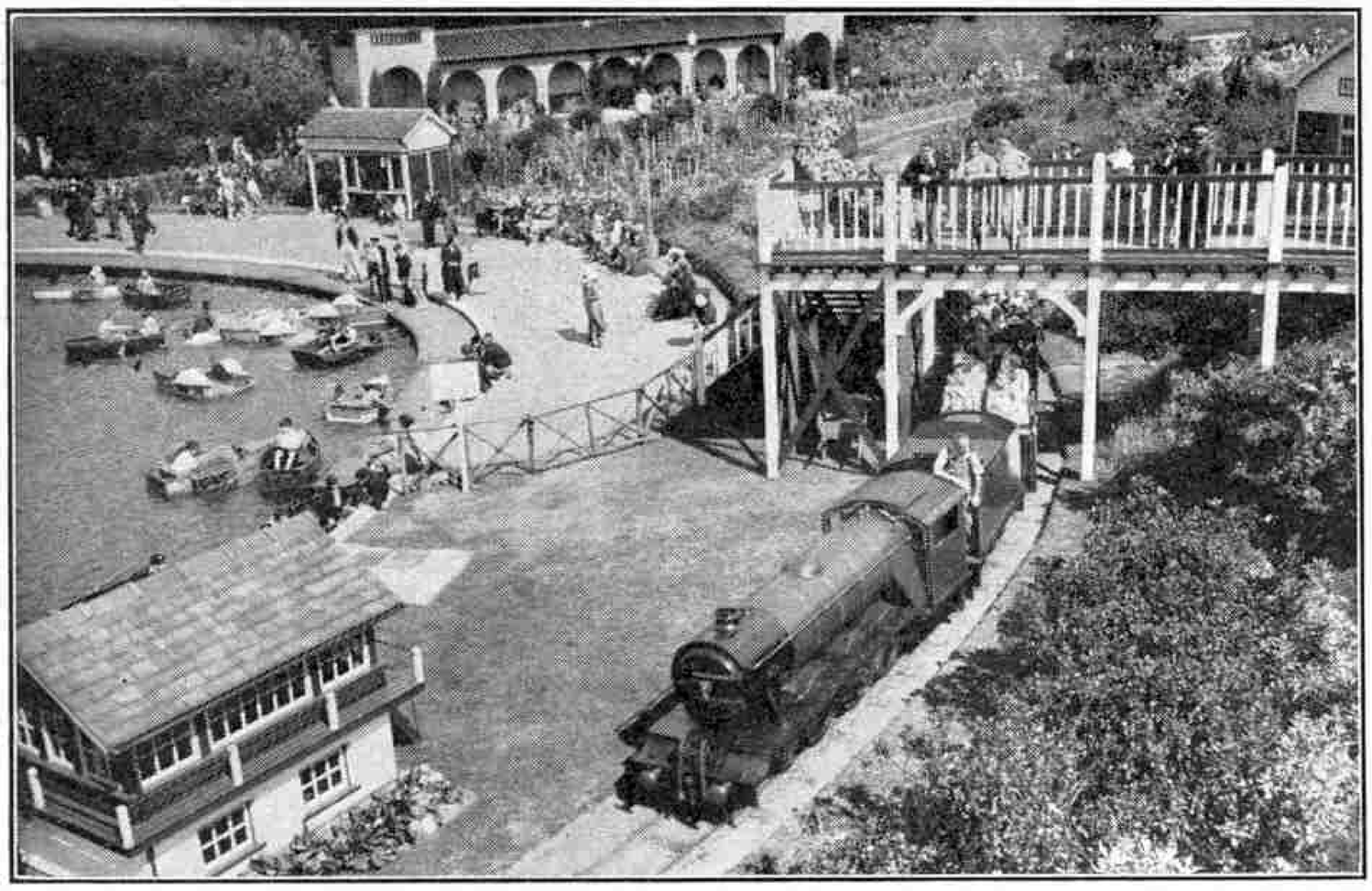
A word must be said about cost. A cabin-cruiser such as the one we used, sleeping six persons, can be hired for something between £8 and £12 a week according to the season. This includes insurance and a free lock-pass over the Thames down to London. The charge for a lock-pass for the Grand Union between London and Braunston is £2, and one for the Oxford Canal costs £1/13/9. Petrol consumption varies according to the direction and force of the wind, and on the Thames is affected also by the strength of the current. We used rather more than 40 gallons in the 250-mile trip, but this heavy consumption is partly explained by the fact that we had half a gale blowing against us all the way back from London to Oxford.

A fair estimate for food is 15/– per head per week. This allows for three cooked meals a day, and tea—such a cruise begets large appetites! Apart from these items, there are only sundries, such as paraffin for the Primus stoves, hire of wireless—if one wants to do things really well!—and occasional tips. An accurate record of expenditure was kept on this fortnight's cruise, and it worked out at little more than £2/10/– per head per week, everything included. This is a great deal less than might be spent at a seaside resort, and it would be hard to take a holiday offering more freedom and novelty than such a cruise.

Readers accustomed to car cruising may perhaps be a little scornful of such speeds as three, four and five knots, which are the maximum advisable on canals. On the river speeds up to perhaps eight knots may be maintained, but by the time we reached the Thames we were well content to idle, as there was so much to see to port, and to starboard that we should otherwise have missed. We found 30 miles—and 30 locks!—a good day's travelling.

Some Popular Seaside Railways

Thrills of Travel in Miniature



A train on the North Bay Miniature Railway, Scarborough, leaving Northstead Manor Gardens for Scalby. For this illustration and the upper one on page 454 we are indebted to the courtesy of the Scarborough Corporation.

THERE is no need to remind *"M.M."* readers of the attraction of miniature locomotives and indeed of working models of all kinds. Interest in these things is the birthright of every boy—and many of their sisters too!—in this mechanical age. To many the appeal of the miniature locomotives reaches its highest pitch when the engine is sufficiently large to haul a train carrying "real live" passengers. Fortunately there are several railways of this kind where the thrill of a ride behind a miniature locomotive can be enjoyed. These are mostly situated at seaside resorts, and in this holiday month details of some of these lines will appeal to readers generally, and particularly to those who happen to be staying in the places concerned. We shall not refer to such lines as the Romney, Hythe and Dymchurch or the Ravenglass and Eskdale. Those are built for public utility and, although miniature railways in the sense that they are laid to 15 in. gauge, they play an important part in the transport of the districts in which they are situated.

Experiments as long ago as 1875 showed that a railway could be successfully built to a gauge of 15 inches, which results in locomotives approximately one-quarter to one-third full size, according to the constructional scale employed. The first miniature railway of 15 in. gauge in this country was at Eaton Hall in Cheshire, connecting the Duke of Westminster's mansion and farms with the G.W.R. Balderton Station, 4½ miles away. This was developed primarily for estate purposes. The first public 15 in. gauge railway was laid on the South Shore, Blackpool, in 1905.

The Lakeside Miniature Railway at Southport is an old established system with a record of 28 years' continual service. Its length is approximately half a mile, and it connects a miniature station close to the pier with "Pleasureland" Station, passing through floral gardens close alongside the Marine Lake. This railway is unique in not being run by a company or Corporation, but by a single owner, Mr. H. N. Barlow, who took control in 1933, and personally supervises everything.

The track is laid with flat-bottomed rail which is, for the most part, fixed by dog-spikes to wooden sleepers. As these sleepers are cut from the timbers used in actual practice it will be appreciated that they help to make a very sound track.

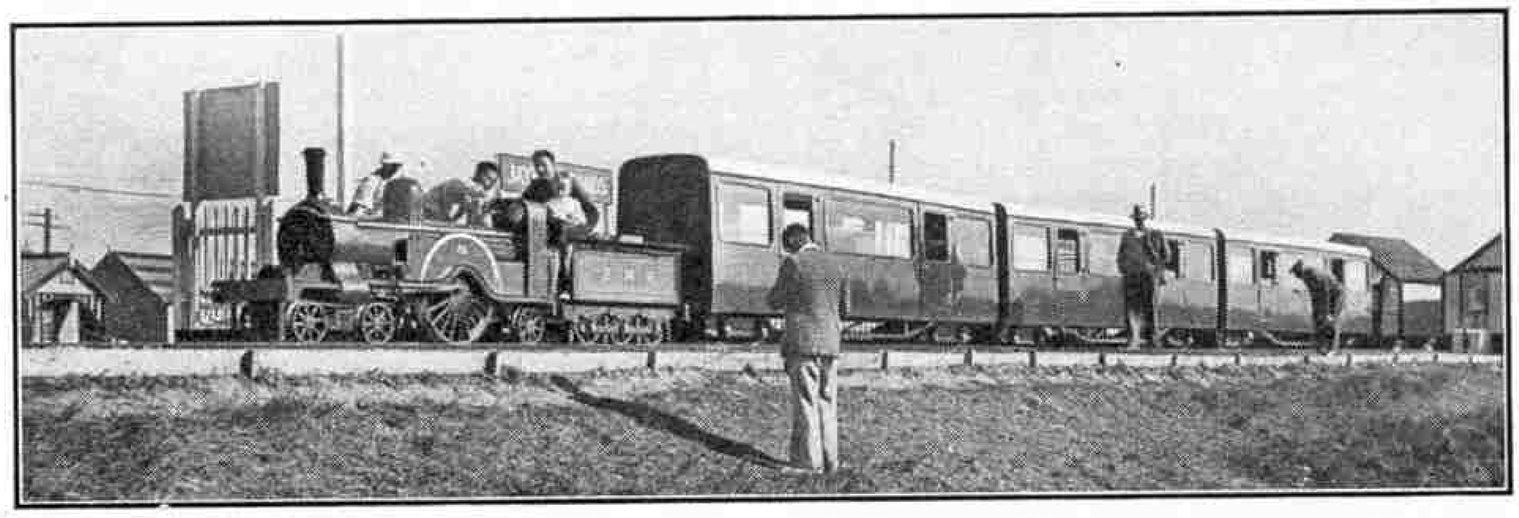
At "Pleasureland" Station there is an island platform served by two tracks that converge at the platform end; the main line from that to the Pier Station is single. Only one platform is in use at the latter end of the line, but it is possible that alterations will be carried out that will improve the layout from the point of view of handling traffic.

At the present time, when there are two locomotives in steam, one of them has to wait until the other has made the journey from "Pleasureland" to the pier and back before it can draw out with its train. The traffic is worked very smoothly however. Close to "Pleasureland" Station is the locomotive running shed. Activities here, when the locomotives are standing over the pits during steam raising, are in full view of the public, and always create great interest. The term "over the pits" is literally correct for between the rails outside the shed are arranged actual sunken pits to facilitate inspection of the underneath of the engines and for fire-dropping at the end of the day. This running shed replaces an older structure situated part of the way along the line that was damaged in a serious fire last year.

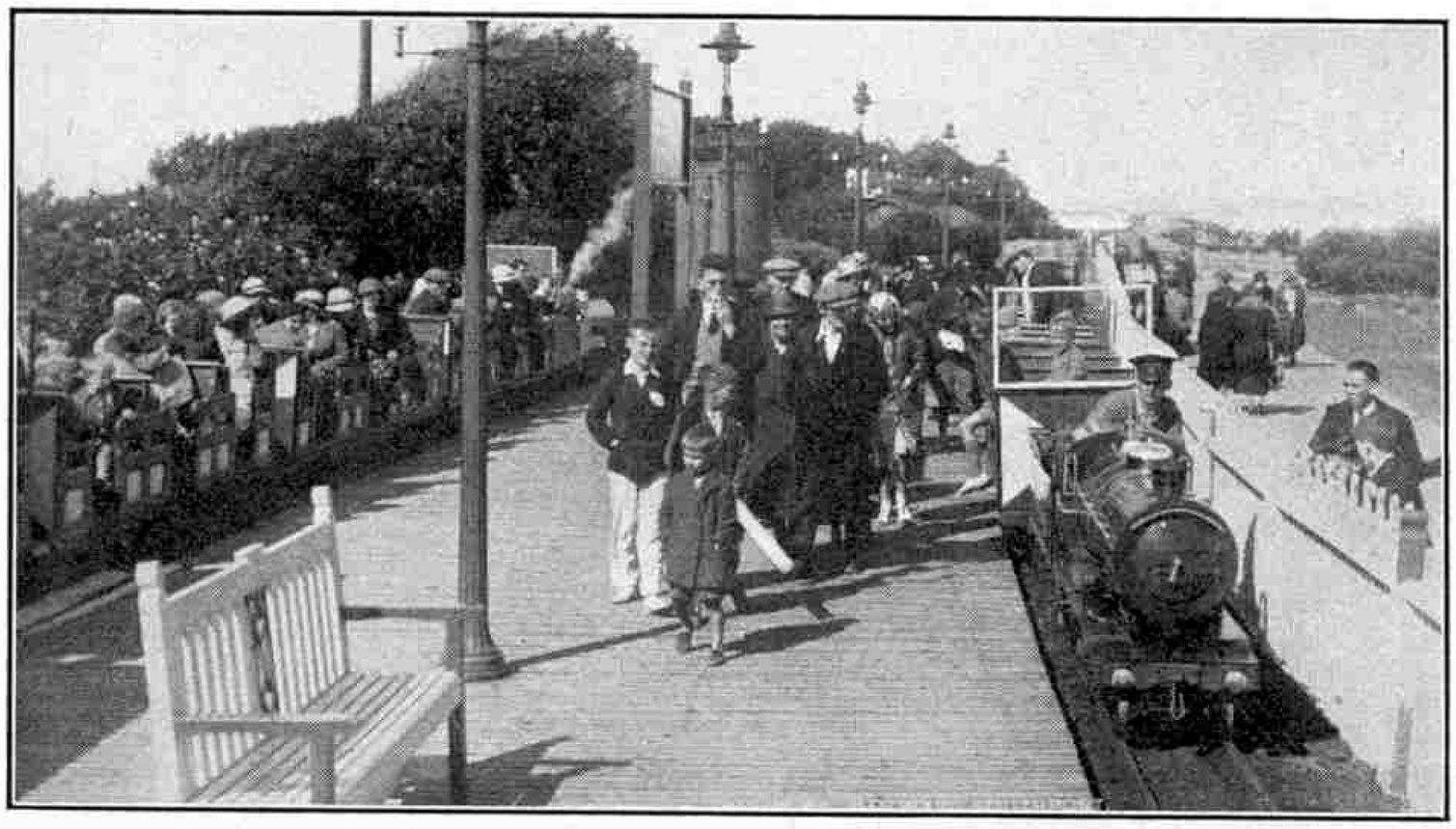
"Atlantic" type locomotives are used. These have been built by the owner of the line in his own workshops, and their general appearance and performance speak well for the soundness of their design and workmanship. The engines, which are named respectively *"King George"* and *"Princess Elizabeth,"* have two outside cylinders with valve chests inside the frames, the slide valves being operated by Stephenson's link motion, controlled by the usual hand lever mounted on a notched quadrant plate in the cab. The healthy regular beat of these locomotives is a joy to hear and is evidence of sound design and precise maintenance. The boilers have superheaters and the fuel used is a special grade of furnace coke.

Bogie tenders ensure ample supplies of fuel and water, and in addition of course provide accommodation for a driver who has a seat at the forward end of the tank. Engines and tenders are finished in an attractive shade of green, and various parts such as the safety valve casing, the cab fittings and the beading on the tender sides, are chromium plated. The passenger vehicles are of the open type finished in attractive shades of cream and green. They are bogie cars that provide comfortable running for the passengers.

From Southport we move to Wales. Across the mouth of the beautiful Mawddach Estuary there stretches from Fairbourne on the south side, to within quarter of a mile or so of Barmouth on the



A fine "single-wheeler" at the head of a train on the Jaywick Miniature Railway. Photograph by courtesy of The Miniature Railway and Specialists Engineering Co. Ltd., Eastbourne.



A busy day on the Lakeside Miniature Railway, Southport. Photograph by courtesy of H. N. Barlow, Southport.

north side, a long shingle bank. Along this bank runs the Fairbourne Miniature Railway, providing a connection in summer between Fairbourne and Barmouth. Prior to 1916 this was run by a horse tram, but then it was converted into a miniature railway.

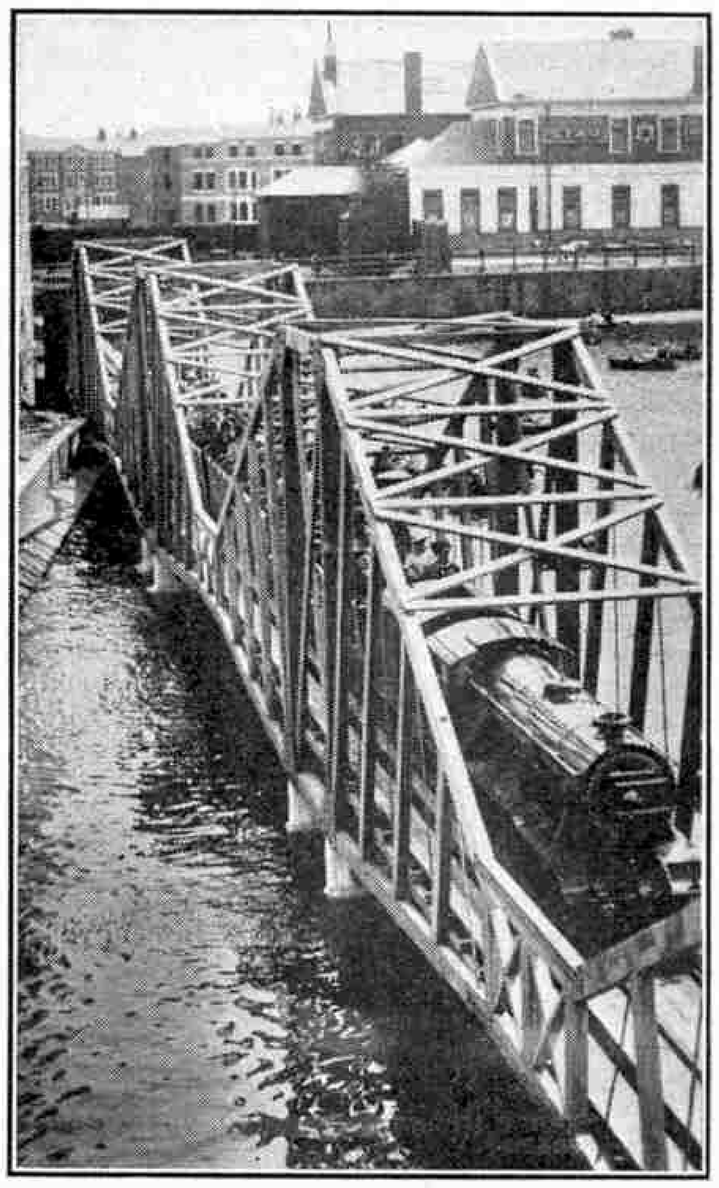
Starting at Fairbourne close to the G.W.R. station, the line runs alongside the beach road as far as the Bathing Beach halt, which is the first stop. After this the line turns sharply to the right and starts to wind its way through sandhills and over shingle banks. The next halt is at the Club House of the Fairbourne Golf Course; leaving there the track continues over shingle for about half a mile or so, and then runs along the edge of the Golf Course. In places it crosses the line of play of the golfers, although it does not interfere with the game in any way but merely makes the course more "sporty." The Club provide special rules regarding the railway.

After leaving the Golf Course there is a small bridge that carries the line over a hollow. Immediately over the bridge it turns sharply again and comes on to a shingle bank exactly opposite Barmouth; this place, which is called Barmouth Ferry, is the terminus. From here passengers take a ferry boat into Barmouth.

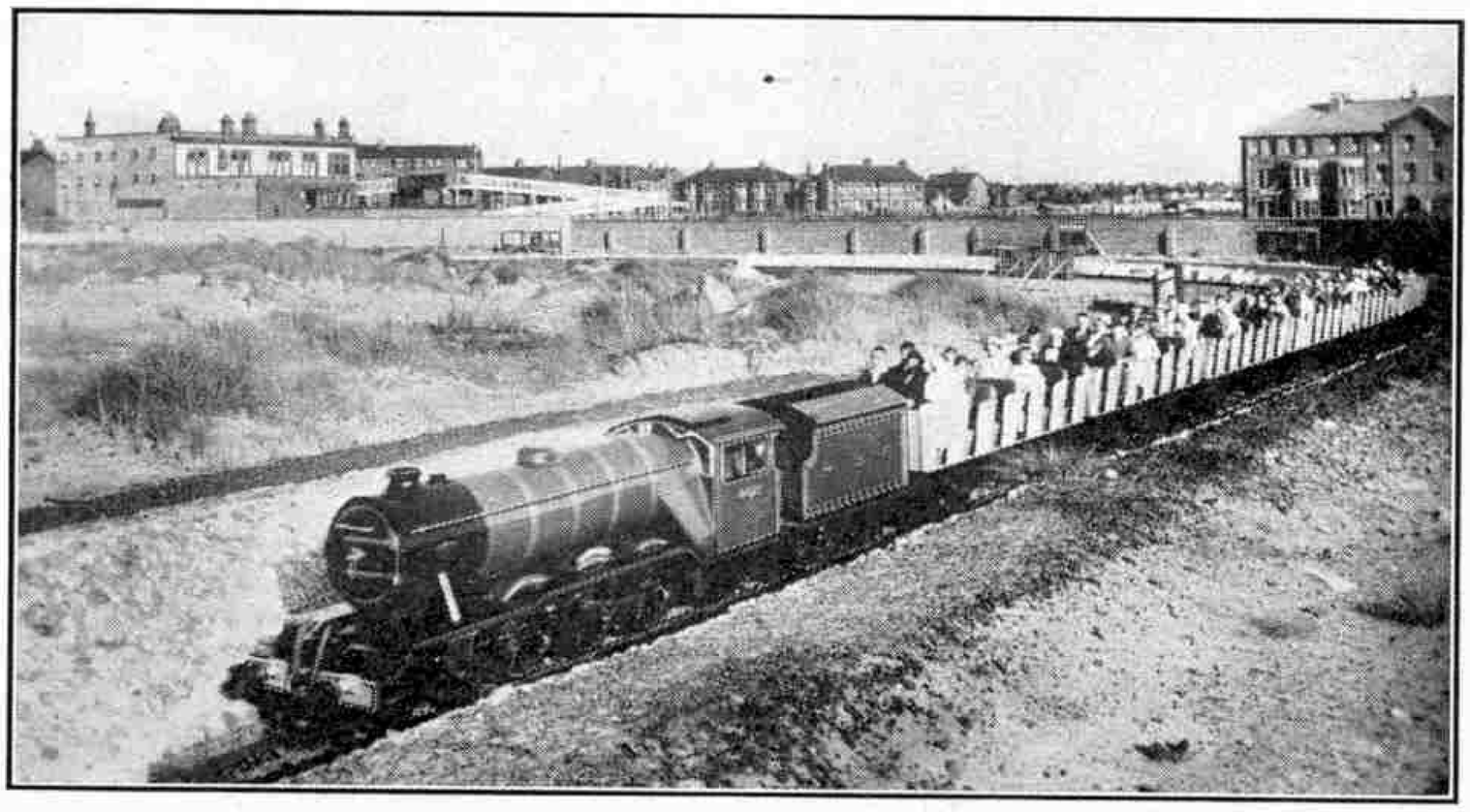
The rolling stock consists of two Locomotives, one petrol and one steam, and five passenger carriages. The steam locomotive is a 4–4–2 "Atlantic" and weighs approximately 2½ tons in working order. It has two outside cylinders with inside Stephenson's link motion. The slide valves are above the cylinders, which means that there is a special rocking lever motion to transmit the movement of the valve gear from the inside of the frames to the outside. The boiler is an exact replica of a full-size locomotive boiler. All the necessary boiler mountings are included, such as pressure gauge, water gauge, two injectors, safety valve, whistle valve and so on. This engine was built originally for a racing motorist, the late Count Louis Zbrowski, but after his death it was purchased by the Fairbourne Estate, and put into service there. It now appropriately bears the name of *"Count Louis."*

The petrol unit is a Lister Auto-Rail Truck, with a 9 h.p. engine; this makes a very useful "spare." There have been three other locomotives previous to the ones at present in use. The first was built specially for the line and was similar to the *"Count Louis"* but slightly smaller; it was named *"Prince Edward of Wales."* The next was *"Katie,"* one of the old engines built for the Duke of Westminster's line at Eaton Hall. This was an 0–4–0 tank engine and had a peculiar habit of always running out of steam. It was broken up at Fairbourne and a goods wagon has been made out of the chassis! Later came a fine model of one of Patrick Stirling's excellent engines of their day, the 8 ft. "Singles."

The engine shed and office are at the Fairbourne end of the line. At each end there is a run-round loop for running the engine round the train, but there are no turntables, so that the steam engine has to run tender first in one direction. During the busy season a 40-minute service is maintained throughout the day, Sundays included. Loads of as many as 70 passengers have been hauled by one engine alone for the whole distance, which is nearly two miles, with one or two sharp "banks" on the road. There is a staff of three who each in turn do a bit of driving, platelaying, ticket collecting, and various other duties that have to be performed in connection with the running of the railway.



The "Pleasure Beach Express" crossing the Forth Bridge on the miniature railway at Blackpool.



Passengers enjoying a trip on the "Pleasure Beach Express." This illustration and the one on the right are reproduced by courtesy of Blackpool Pleasure Beach Ltd.

Steam is still supreme on the Jaywick Light Railway, situated at Jaywick Sands Estate, Clacton-on-Sea. This connects a new estate development with the sea front, the track being just over a mile long and following the winding course of an old sea wall across the marshland. Although from a railway engineer's point of view a much shorter route could have been chosen, the many twists and turns on the existing layout prove a constant pleasure to passengers. The gauge is 18 in. and the rails are of flat-bottomed section weighing 12 lb. per yard, mounted on steel sleepers and ballasted with gravel.

Starting from Crossways Station, which is nicely laid out in the regulation manner with a concrete platform, white fencing, flower borders and shrubs, the line soon enters a short tunnel cut through a small mound, and then after a short gradient of 1 in 50 crosses a bridge on to the sea wall.

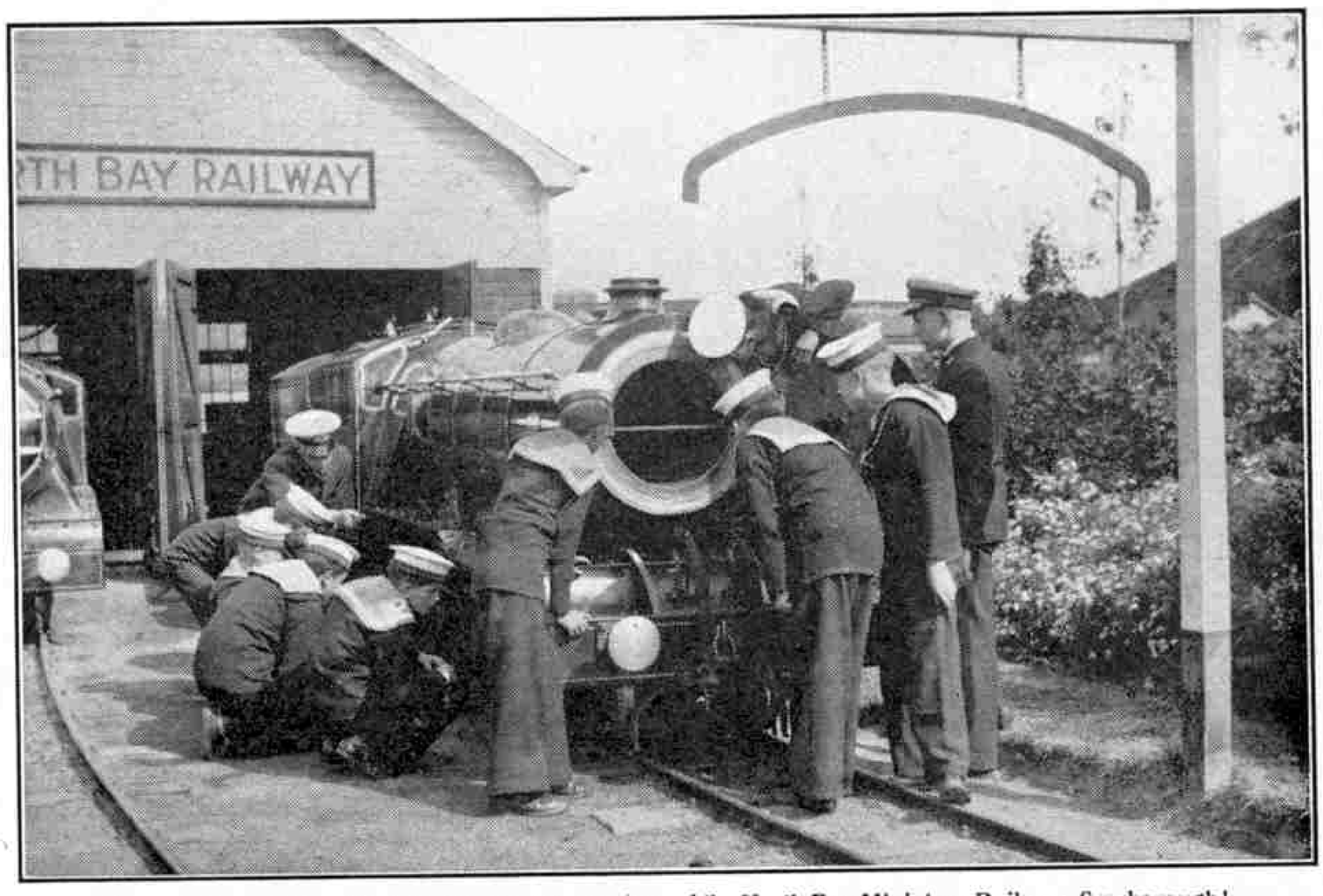
This meanders across a wide stretch of pleasant marshland and brings the line into Jaywick Sands bungalow town. Here the line terminates at the sea front at Jaywick Sands Station, a timber structure on the side of the embankment. Both stations are fitted with passing loops and automatic points to enable the engine to run round the train for the return journey.

At Crossways Station there is a siding leading to the combined engine shed and repair shop, in which the track is raised to allow work under an engine to be done with ease. The workshop is well equipped with machine tools including a lathe, milling machine, drilling machines, etc., and an air compressor, all being driven by a 2 h.p. electric motor.

Since the opening of the railway the service has been worked by a most interesting model of one of the well-known Stirling 8 ft. 4–2–2 single-wheelers of the former G.N.R. It is fitted with a domed boiler, and thus represents the condition of some of these engines as reboilered by Mr. H. A. Ivatt, for the domeless boiler was a feature of Stirling design. It is quite a big engine, weighing 2½ tons in working order, and its boiler is of steel, working at a pressure of 120 lb. per sq. in. An interesting accessory is the Westinghouse air pump mounted on the cab side, for the engine and train brakes are automatic, worked on the Westinghouse air pressure system. Two air tanks are mounted on top of the tender in connection with the braking system.

The coaches are of the saloon type mounted on four-wheeled bogies. Their bodywork is of steel on wood framing and lined with pressed hard board. The seats are upholstered in a green moquette and sprung with rubber filling, and all three coaches are fitted with sliding windows and electric light. A dynamo and battery supplies the current.

This year a new locomotive, designed and built in the running shed by Mr. C. F. Parsons and Mr. L. May, has been put into service. It is a model of the "Sentinel" type of shunting locomotive, and is fitted with a high-pressure water tube boiler and a Stanley steam car engine driving through

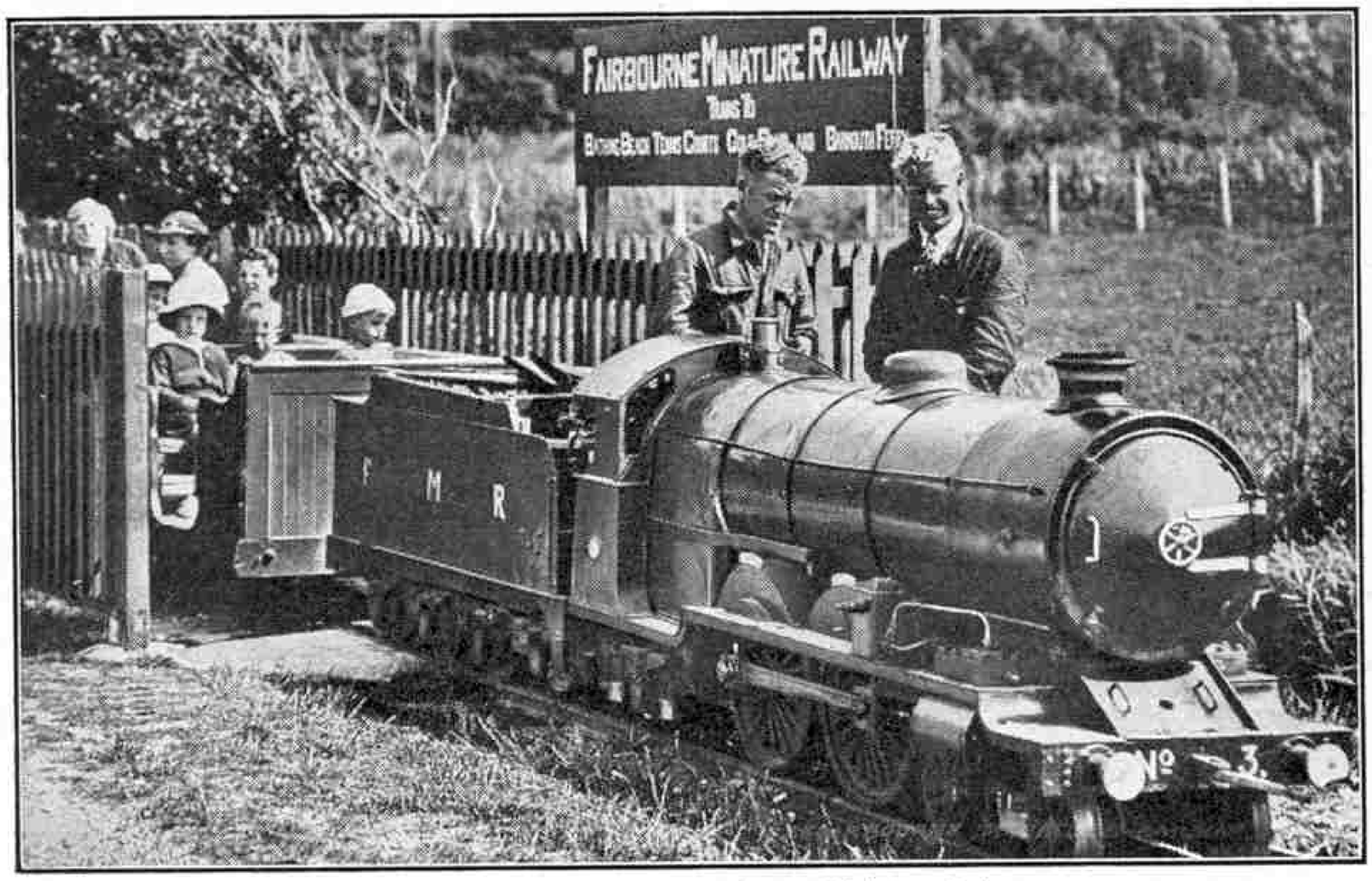


The Navy takes special interest in one of the engines of the North Bay Miniature Railway, Scarborough!

cylinder enclosed unit fitted with a mechanical lubricator, superheater and exhaust feed-water heater. Braking is by hand brake and a powerful steam brake. The engine, layshaft and axle-boxes have ball bearings throughout. A photograph of this unique motive power unit will appear in next month's *"M.M."*

A most interesting East Coast System is at Scarborough, where is situated the North Bay Miniature Railway, seven-eighths of a mile long with three stations. This line is operated by two trains each consisting of a locomotive with five coaches capable of carrying 100 passengers. The design and construction of the railway, which is in the Northstead Manor Gardens, was carried out by Mr. H. W. Smith, A.M.I.C.E., ex-Borough Engineer of Scarborough.

The railway is controlled by a regular tablet signalling system and there are loop



Ready to start. A scene on the Fairbourne Miniature Railway.

gearing and chains to the four wheels. The boiler is oil-fired and works at a pressure of 250 lb. per sq. in. The engine is a twin-

lines for passing purposes. Each locomotive is of the 4–6–2 type and is a model externally of the L.N.E.R. Gresley "Pacific"

engines. Instead of being driven by steam, however, a Diesel engine is used as the prime mover. A special feature is the Vickers-Coats converter which eliminates gears and clutch, and makes it impossible to start the locomotive with a jerk as with a clutch gear. The controls are arranged exactly as in a steam engine, the driver having to operate the throttle, forward and reverse lever and Westinghouse brake. Each engine weighs approximately 4½ tons.

The coaches are eight-wheeled bogie vehicles, 24 ft. 6 in. in length, fitted with seating in the "toast-rack" form for 20 passengers per coach. The bogies are built up as in standard main line practice. The frames are as nearly as possible scale models of the frames of main line 50 ft. coaches with spring buffers and screw couplings, and each coach weighs 2½ tons. Each train is fitted with Westinghouse brakes throughout. The track is constructed to 20 in. gauge, and consists of flat-bottomed rails weighing 20 lb. per yard supported on creosoted wood sleepers.

Another miniature railway on which Diesel power is used is the Pleasure Beach line at Blackpool. This also is a 20 in. gauge system, and it boasts such interesting engineering features as an actual terminus station, and a reproduction of the Forth Bridge by means of which the line is carried over the Boating Pool. The crack train of this line is appropriately named the *"Pleasure Beach Express."* Open cars of the usual type are used, running on four-wheeled bogies.

Among the locomotives is an L.N.E.R. "Pacific" model that bears the well-known number 4472, but is named *"Mary Louise."* Externally the engine is a perfect reproduction of the real *"Flying Scotsman"* and, although powered by a Diesel engine; complete outside cylinders and motion are provided. Even the Doncaster pattern of makers' plate mounted on the side of the smoke-box is copied. The tender is eight-wheeled and bears the initials P.B.E., signifying *"Pleasure Beach Express."*

Another locomotive is practically a tank counterpart of this design, having the 4–6–4 or "Baltic" wheel arrangement. This engine bears the number 4473 and is named *"Carol Jean."* It follows the general external features (Continued on page 506)

The Airspeed "Oxford"

A Twin-Engined R.A.F. Trainer

THE Airspeed "Oxford" is one of the aircraft in use for training purposes in the R.A.F. It was designed and produced to an Air Ministry specification calling for a twin-engined training aeroplane with a retractable undercarriage and provision for instruction in navigation, wireless telegraphy, aerial photography, air gunnery, and bombing. It is a splendid training machine for pilots who later will be called upon to fly the multi-engined high-speed aeroplanes recently introduced into the Service, and also can be adapted for military purposes, particularly coastal reconnaissance, and makes a useful "general-purpose" machine for equipping the air forces of small countries. Our cover, which is reproduced from an illustration kindly supplied by Airspeed Ltd., Portsmouth, shows the attractive and efficient appearance of the "Oxford" in flight.

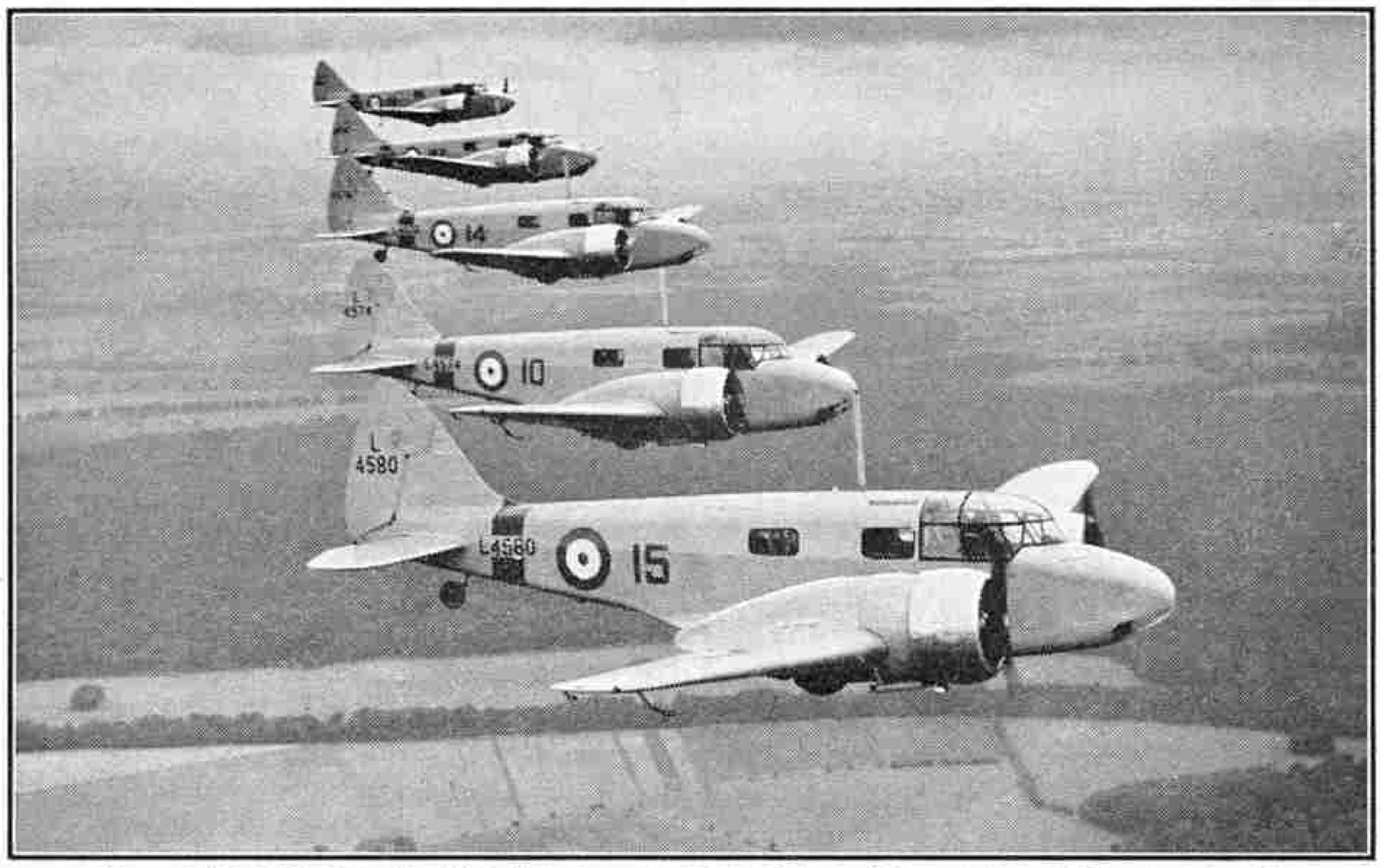
This fine machine is mainly constructed of wood. The use of this material instead of metal is particularly interesting, and the claim is made that with wooden construction maintenance is easy and low in cost, and in emergency local supplies of wood can be used for repair in the field. Excellent materials, including reliable synthetic glues, are now available for constructional work of this kind, and there is no fear of warping after the application of the various protective finishes, such as Green Cellulose Finish D.T.D. 63, or trouble due to unreliable joints.

The "Oxford" is a low wing monoplane fitted with two 375 h.p. Armstrong Siddeley "Cheetah X" engines, which give it a top speed of 192 m.p.h. at 8,000 ft. It cruises at 166 m.p.h. at 5,000 ft. and carries sufficient fuel for 5½ hrs. flying. The span is 53 ft. 4 in. and the length is 34 ft. 6 in.

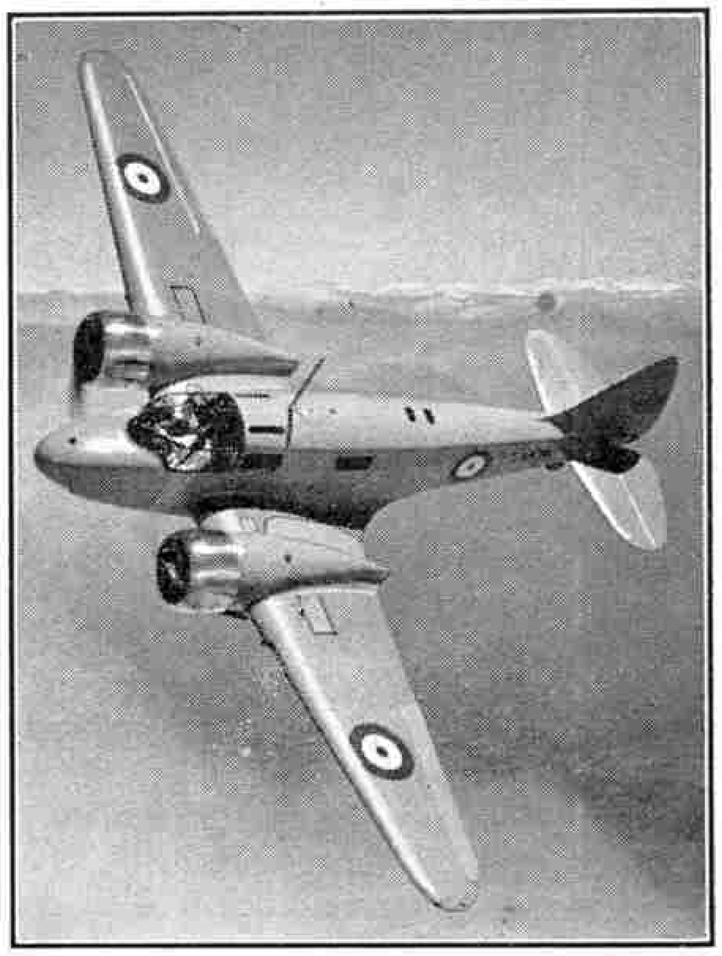
The wing tapers in plan and in thickness, and is built of spruce spars and ribs, over which are coverings of three-ply and doped linen fabric. It is constructed in three parts, a centre section and two outer sections, so that it can readily be transported by road when dismantled. The centre section is built as a separate unit from the fuselage and contains the two main fuel and oil tanks, and engine installations complete with fireproof bulkheads, also the bomb well in the centre and retracting undercarriage mechanism and wheel housing. Slotted metal ailerons and duralumin split flaps that can be lowered to an angle of 80 deg. are fitted, and a pair of landing lights are installed in a recess in the leading edge of the port outer section, the edge at that point being transparent. The beam is adjustable from either pilot's seat.

The fuselage is of very clean external design, without outside wires or struts. It is built up of four spruce longerons and hoops, with a covering of three-ply, with the outer grains running at 45 deg. to the fuselage axis, and is in two parts joined by spliced longerons bolted by aluminium fishplates, the front portion including the pilots' cockpit and the cabin, and the rear portion the tail unit. The extreme nose of the fuselage is constructed in aluminium panelling and has a large bomb aimer's window of moulded plastic transparent material. The forward bulkhead, which is just behind the pilots' seats, is specially reinforced to withstand the loads imposed in the event of an overturn landing.

The crew of the "Oxford" normally never exceeds three, but can be varied according to the particular branch of training for which the machine is required, provision being made for a navigator or second pilot, or a bomb aimer, a wireless operator, or a rear gunner in addition to the pilot. The cockpit contains seats for two, the first pilot occupying the one on the port side.



Airspeed "Oxfords," standard R.A.F. trainers, in flight. Photograph by courtesy of "The Aeroplane."



The Airspeed "Oxford" flying above Portsmouth Airport. Photograph by courtesy of "Flight."

When a navigator is carried he occupies the starboard seat, which can be turned around so that he can work on the spar platform, aft of the seat, which makes a handy chart table. When the dual control is not being used, access can be obtained to a prone bombing position in the nose of the fuselage by removing both the control column and the rudder pedals, and sliding back the second pilot's seat. The bomber then lies with his chin on a rubber cushion, and peers through the bomb-sighting window in the underside of the nose of the aeroplane. The bombs are carried in the wing centre section, between spars extending under the chart table.

The wireless operator occupies a seat behind the pilot, and controls the retractable D.F. loop just aft of the wireless mast, also its retractable trailing aerial. When there is a rear gunner on board he is accommodated in a revolving gun turret at the rear of the cabin. The gun in this turret can be elevated until it is vertical, and the gunner's seat, which is also connected to the turret-rotating mechanism, moves up and down with the gun.

The undercarriage is raised or lowered hydraulically, but hand operating gear also is provided by which the undercarriage can be pumped to the down position if the engine-driven pump fails to act. Red lights tell the pilot when the wheel units are up, and green lights show when they are lowered. In addition a horn sounds a warning note if the engines are throttled back with the undercarriage retracted, so that the pilot cannot forgetfully land with the wheels up.

The two engines of the "Oxford" are carried in welded tubular steel mountings with nacelles, faired into the leading edge of the wing, which are attached to the wing centre section at four points by means of rubber insulated joints. The port engine drives a 500-watt generator, and the starboard one drives the pump for the hydraulic system, the compressor for the brake and the vacuum pump for the blind-flying instruments. Each engine has its own fuel unit, consisting of two welded aluminium alloy tanks of 49 gall. capacity carried in the wing centre section, and each pair of tanks is interconnected with two 29-gall. auxiliary tanks carried in the outer sections of the wing.

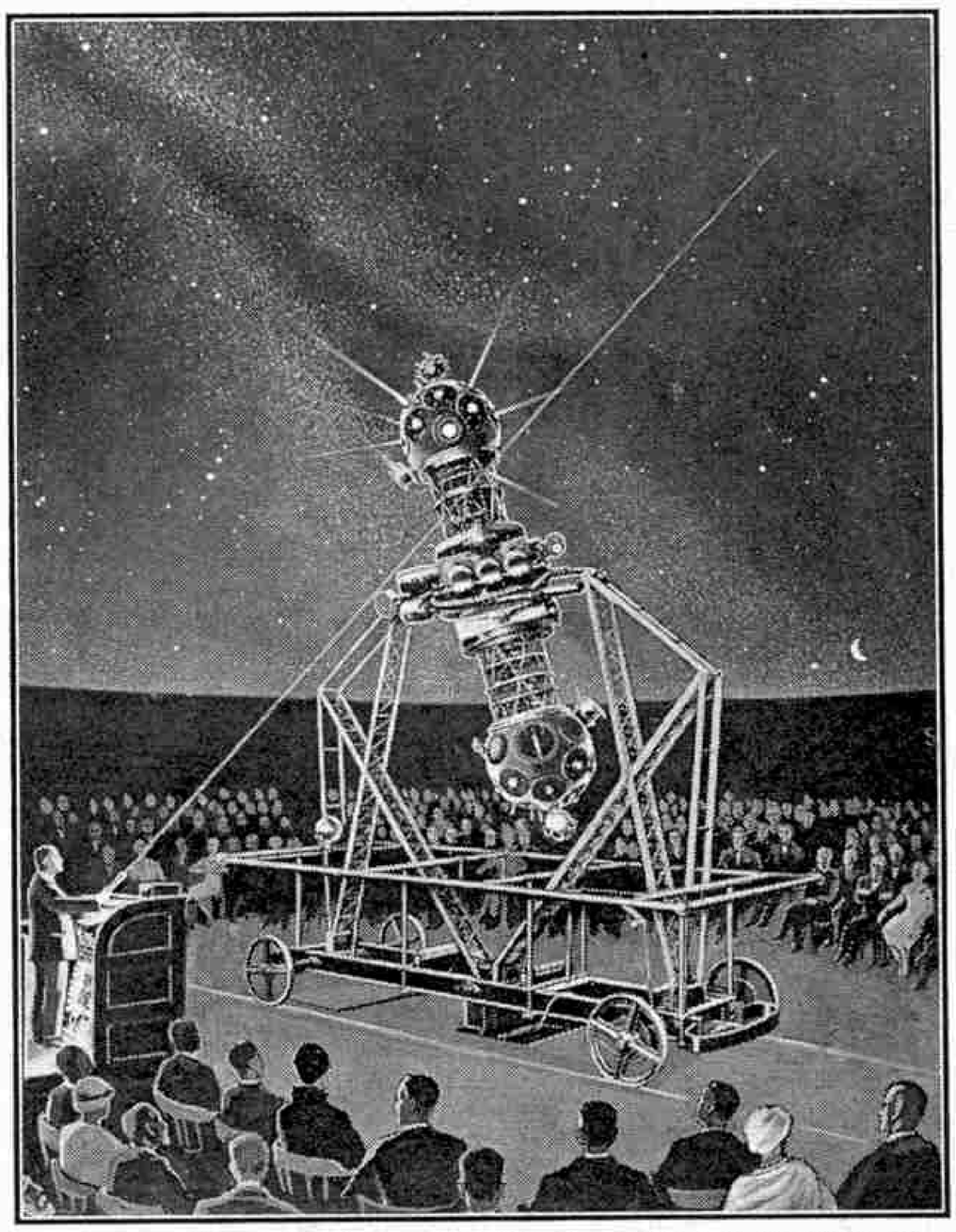
Star-Gazing Made Easy

The Heavens Projected on an Artificial Sky

By A. Williams, M.R.S.T.

THERE are 27 places, from Los Angeles in the far west to Japan in the far east, where a representation of the stars in an artificial sky can be viewed at any time of the day or night. These are the 27 planetaria built by the famous optical firm of Carl Zeiss and invented by Dr. Bauersfeld, an expert adviser to the firm at their factory in Jena. Bauersfeld's idea was original and daring. It was nothing less than to build a great hemisphere to represent the sky, cover its inner surface with a white screen, and project upon it points of light to represent the actual stars. A machine containing a multiplicity of small projectors was necessary, and this had to be geared to move the projectors so that the day-to-day movement of the stars could be accurately reproduced on the dome.

This "scientist's dream" was ridiculed in some quarters, but Bauersfeld and his assistants persisted in their experiments with the doggedness shown by all scientists who have faith in their own ideas. In the end they won through, although it took them five years, and their invention exceeded all expectations in its accuracy and ingenuity. The first planetarium to be opened regularly to the public was completed in Jena in 1926, and since then over half a million people have visited it, although it will hold only 400 at a sitting. The attendances at planetaria in some of the larger and more populated centres have been even more impressive.



Stars in an artificial sky. A representation of a portion of the Milky Way projected on the dome of the Jena planetarium.

The planetarium at Jena occupies a modest corner in the Princess Gardens in that city. It is entered through a simple portico, on one side of which is a box-office, the charge of 50 pf., equivalent to about 6d., being made for admission to one lecture. On the left beside the entrance is a small enclosure, rather like a large witness box in a court of justice, in which is the switchboard from which the complicated machine housing the many projectors is operated. The machine itself is shaped like a huge dumb-bell and is mounted on a steel framework in the centre of the theatre. It weighs 2½ tons and stands 14 ft. high. In its rounded ends are lenses of different sizes, and through these internal electric lamps project on to the cloth-covered dome points of light that represent with great fidelity about 9,000 of the stars, which is the greatest number that can be seen on the clearest nights by anyone possessing really fine eyesight. The projectors for the planets and the Sun and Moon are contained in separate cases nearer the middle of the machine, but still aligned with its main axis. Obviously they need separate treatment, as they change their positions more quickly than the fixed stars.

As the theatre darkens, all these lights twinkle out on the ceiling, and the dome seems to expand and become the very sky. A faint glow surrounding the "horizon" is produced by special lighting in further imitation of Nature. Along the base of the dome is a silhouette of Jena's sky-line, reproducing the main buildings as they would be seen from that position against the night sky, and helping to give the impression that it is the actual sky that is seen by the audience. The lecturer, controlling the instrument from his box, points out the constellations as they pass across the "sky." He can make this wonderful machine reproduce for us on the dome the movements of the planets, the Milky Way, groups of shooting stars, and even a comet; and he indicates special points of interest by means of a hand flashlamp that projects an arrow on the dome.

The gears in the machine are driven by small electric motors incorporated in it. When the lecture begins, the "stars" on the dome are in the position for the latitude of Jena and for that particular day, but their movements throughout the day and night can be speeded up, so that changes occurring in Nature in a day can be produced by the planetarium in a minute. The stars seem to race across the sky when this speed is used, and we soon find ourselves looking at them as they will appear in the middle of next week!

This movement into the future can be extended indefinitely, and by using a different motor the planetarium can carry us forward 26,000 years in four minutes! The skies of the past also can be explored by reversing the movement. Imagine the thrill of looking up into the sky as Galileo himself saw it, or of going farther back, with a correspondingly greater difference, and seeing how the heavens appeared to the Sages of Chaldea who laid the foundations of astronomy!

The skies of other lands can be reproduced by swinging the "dumb-bell" over. While a lecture is in progress the members of the audience may see the stars as if they were

looking upward from other latitudes than that of Jena. They may view the sky as it appears at the Poles, seeing either the Midnight Sun or the long night of the Polar regions, and look at stars never visible in northern skies, such as those of the Southern Cross. All these can be seen in their daytime positions. In the real sky the Sun normally outshines them, and they are only visible by day on the rare occasions of a total eclipse; but the Sun of the planetarium is only an electric light that can be switched off at will.

An interesting addition that has been made recently is a new gearing that reduces the speed so considerably that it appears almost normal. This motion is generally brought into operation at the close of a lecture, in conjunction with a gradual raising of the horizon lights, to give an illusion of dawn that provides a most impressive ending.



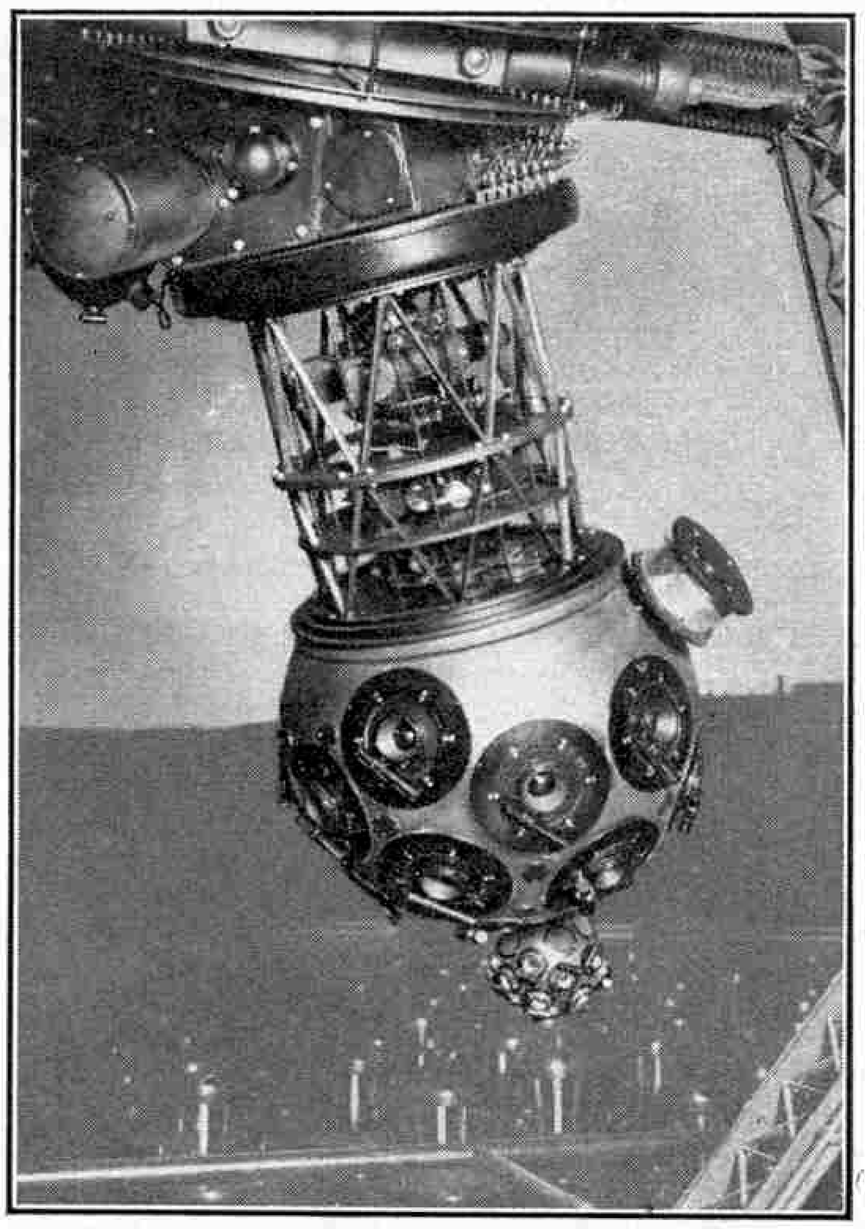
Outside the Jena planetarium, which was the first to be built.

A few figures may give some idea of the complexity of the machine. There are 16 optical projectors in each "dumb-bell" head to show the fixed stars of the northern and southern skies respectively. There are two further sets of 16 projectors that cast the names of the major constellations on the dome.

Nebulæ, star clusters, and Sirius, the brightest star in the heavens, are given by 18 optical projectors, and there are two devoted to the Milky Way. The planets and the Sun and Moon require 18 more projectors, and there are further devices for casting on to the dome lines representing the Equator and the Polar Circles, and for showing the positions of the North and South Poles. Another lens, a single one, is used to allow the onlooker to read off the years as they pass. In all there are 104 of these projectors.

When the room is required for any other purpose the great projecting machine can be moved away along rails set in the floor. To ensure correct re-connection of the wiring after such a movement, plugs of special shapes and sizes, one for each section of the apparatus, are used. The wiring from the lecturer's switchboard is laid in a conduit beneath the floor.

The screen covering the dome is of stretched linen. This was found to be the best acoustically, other materials such as cork, muslin and felt reflecting sound too well for use in a perfectly hemispherical building. The framework of the dome itself consists of 7,992 thin iron rods, each about 60 cm. long, joined at their ends by simple bolts and covered with concrete. This Meccano-like construction was accomplished in eight days by four mechanics, who worked from a revolving scaffold placed inside the dome.



The complicated array of lenses in the head of the giant projector used in a planetarium.

There are now 13 planetaria in Germany, five in the United States, two each in Italy and Japan, and one each in Sweden, France, Holland, Belgium and Russia. One of the most interesting of these is the Hayden Planetarium in New York, which was completed about four years ago. It is much bigger than the original one at Jena, for its artificial sky is 78 ft. in diameter and 733 spectators can be seated within it, each in a chair that can be tipped backward so that its occupant has not to raise his head to an unnatural angle in order to see the "stars." There are 2,187 possible combinations that can be obtained with the projector, and individual stars are magnified on the screen so that they appear as if they were seen through a 3 in. telescope.

The most interesting part of this planetarium is its great double dome, consisting of a hemisphere of concrete that is entirely self-supporting, and an inner one of stainless steel suspended from it.

The outer dome was erected on a lattice structure of wood covered with cork, on which steel reinforcing rods were wired. Concrete was then blown on the top with compressed air guns. The inner dome forms the artificial sky on which spectators see the stars projected. It consists of 561 plates spot welded together, and has a total surface of 10,000 sq. ft. A curious feature is that it is really an immense sieve, for in it there are more than 20 million tiny holes, each 1/16 in. across. These holes are so small that they do not prevent the shell from being used as a screen for projection, but they are sufficient to serve as outlets for the voice of the speaker and for other sounds from the hall, which are not echoed downward but pass through the holes and are absorbed by a cork lining on the inside of the outer dome. A coat of flat white paint over the inner surface of the steel shell provides the screen surface.

Improvements are constantly being made to the instrument, with an amazing extension of its possibilities. With the widening of astronomical knowledge, there is no knowing what marvels the future planetariums may be persuaded to present, and even now the application in the device of astronomy, mathematics, optics and photography, allied to marvellous engineering skill, has made of it one of the wonders of the modern world.



AIR NEWS

An Interesting American Light Aeroplane

The latest model in the series of aircraft produced by the Stinson Aircraft Division, in the United States, is the Stinson "105," a light aeroplane that is shown in the upper illustration on this page. It is intended for the private owner and is a "parasol" monoplane with seating accommodation for three passengers as well as a roomy baggage compartment. The fuselage is made throughout from chrome molybdenum steel tubing, the fin forming an integral part. The wings are built up on spruce spars with metal ribs and leading edges, and three-position balanced flaps are fitted to the trailing edge of the wings to permit steeper glides and shorter and slower landings. The most interesting feature of the aircraft however, is the use of special wing slots, built into the leading edges of the wings. They are marked by the arrows in the illustration, and their purpose is to prevent unintentional stalls or spins during climbs, and to provide a greater degree of control at slow air speeds.

The cantilever undercarriage of the "105" is equipped with spring-hydraulic shock-absorbers and hydraulic wheel brakes. A neatly cowled 75 h.p. Continental A-75 air-cooled engine of the horizontally-opposed type gives the "105" a cruising speed of 105 m.p.h. while the landing speed is only 43 m.p.h. with flaps down. With a full load the range is 391 miles.

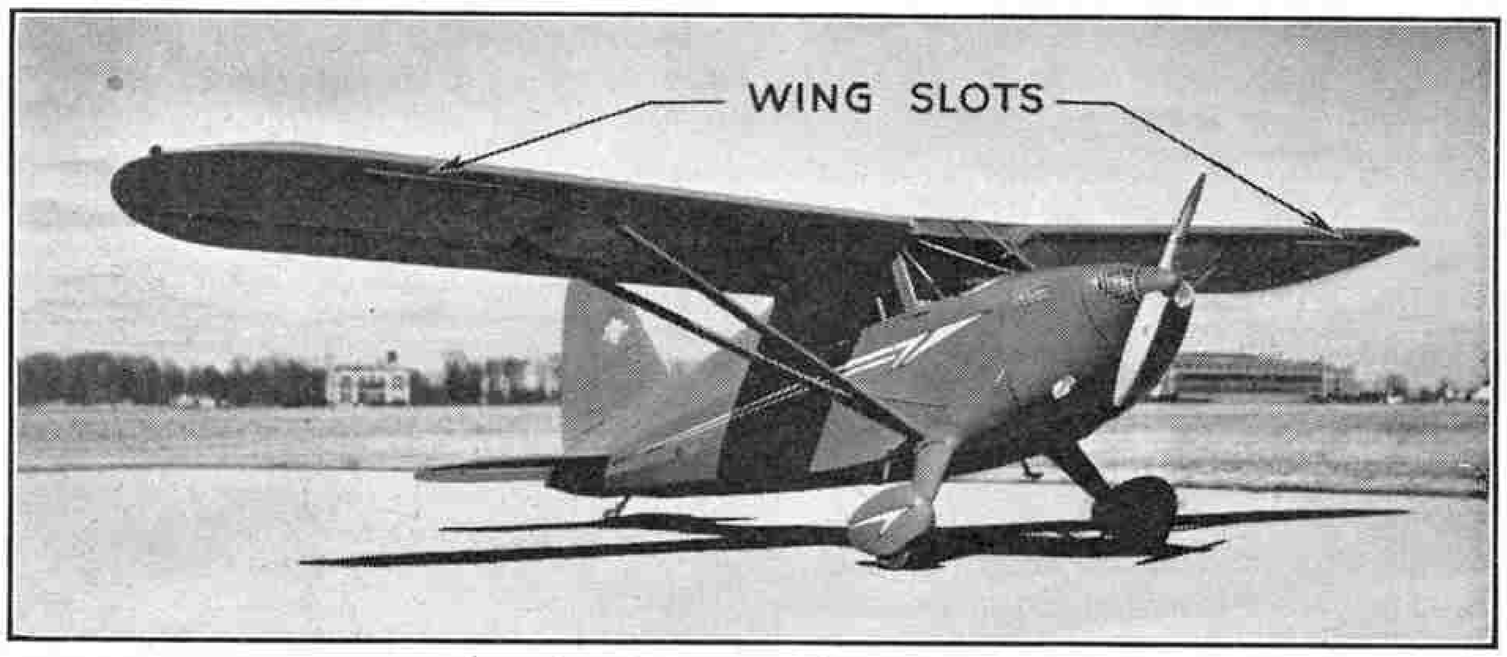
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Blackburn "Skua" fleet-fighter dive-bombers are now in service with the Fleet Air Arm, and are the first monoplanes to be adopted as standard equipment for that Arm. The "Skua" is a single-engined low wing monoplane.

"Ensigns" in Service Again

About half of the 14 Armstrong Whitworth "Ensign" air liners that were recalled from service for modification have been redelivered to Imperial Airways, and the remainder will probably be handed over within a few weeks. They have been given additional power by the installation of Armstrong Siddeley "Tiger" IXc engines, and constant-speed airscrews have been fitted. The new engines give a total of 3,740 h.p. for take-off. The top speed is now 205 m.p.h. and the initial rate of climb at full load is 800 ft. a minute.

Most of the "Ensigns" will go into service with power plants of this type, but later on more powerful engines will be fitted to eight of the air liners that are to be used on the England–Calcutta service. This additional power is likely to prove very useful in the particular conditions on this route.

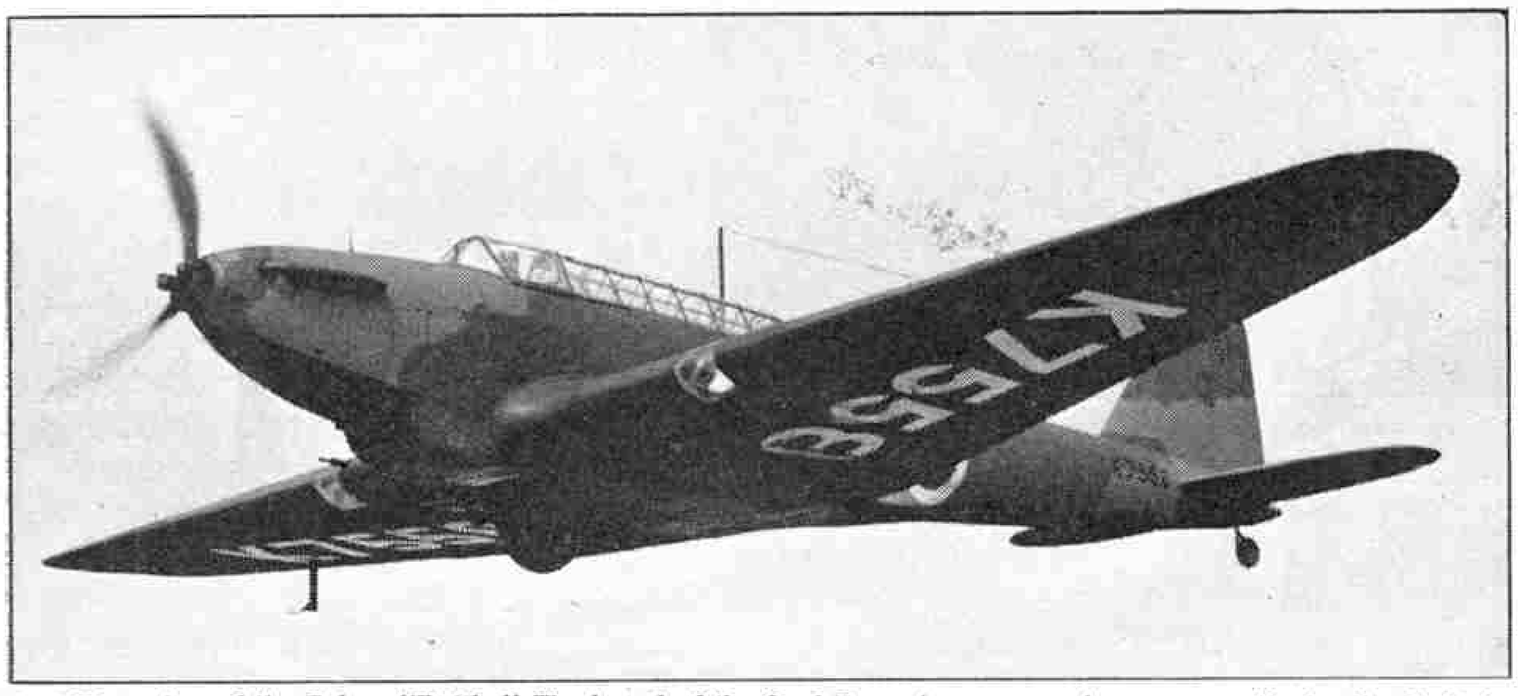


The Stinson "105" described on this page. A special feature of this machine is the use of built-in wing slots. Photograph by courtesy of the Stinson Aircraft Division, U.S.A.

"Stratoliner's" Supercharged Tests

The new Boeing "Stratoliner" recently underwent its first "supercharged" cabin test. The result was described as "more than satisfactory," the automatic pressure regulating or altitude conditioning system working perfectly. This device consists of a number of mechanical blowers or superchargers that increase the pressure of the air as it enters the ventilating system of the aircraft, the pressure being controlled by automatic valves. The "Stratoliner" has two fully independent systems, either of which is capable of handling the cabin pressure requirements alone.

On the test flight the "Stratoliner" was first flown to an altitude of 8,000 ft., when the conditioning system was brought into operation, and the aircraft then climbed to 15,000 ft. At this height the air pressure in the cabin was equal to that at 8,000 ft. After a series of tests in level flight the "Stratoliner" was taken up another 1,500 ft., where instruments in the cabin recorded the apparent altitude as some 9,000 ft. The test pilot later remarked that "there was no feeling of altitude and no feeling of ascent or descent when the automatic pressure regulating equipment was in operation," although part of the descent was made at the rate of 600 ft. a minute.



A striking view of the Fairey "Battle." The barrel of the fixed Browning gun can be seen near the landing light in the starboard wing. Photograph by courtesy of "Flight."

American Military Aircraft for Britain and France

Figures published in a recent United States "Army and Navy Register" show that 650 American military aircraft are on order for Britain and 615 for France. The British order consists, of course, of the 400 North American "Harvard" Trainers and 250 Lockheed reconnaissance aeroplanes. The aircraft on order for the French Air Force consist of 200 Curtiss "Hawk" and 200 North American pursuit aeroplanes and 115 Martin and 100 Douglas bombers.



The flight engineer's and radio officer's stations in the control room of the new Boeing 314. An article describing these flying boats appears on page 470 of this issue.

First Service Flight by Northern Transatlantic Route

On 28th June the Boeing 314 "*Yankee Clipper*" of Pan American Airways arrived at Southampton on the completion of the first flight of a new transatlantic mail and passenger service. There were 19 passengers on board in addition to a crew of 12, and the mail comprised some 60,000 letters, a weight of 1,734 lbs.

The "*Yankee Clipper*" started the flight at Port Washington at 2.27 p.m. on 24th June and covered the 620 miles to Shediac, in New Brunswick, Canada, in about 5½ hrs. There the flying boat was held up for three days by low cloud and fog. Eventually it left at 5.55 in the afternoon of 27th June and arrived at Botwood, Newfoundland, a further 450 miles, some four hours later. After refuelling the "*Yankee Clipper*" left at 1.26 a.m. on 28th June, and took 13 hrs. 30 mins. for the ocean crossing of 1,970 miles to Foynes, Eire, the average speed being about 144 m.p.h. It is interesting to note that on landing at Foynes it still had enough fuel left to have flown about 1,700 miles. The final stage of the flight was made in about 2½ hrs.

The "*Yankee Clipper*" stayed at Southampton for just under 43 hrs., and then left on the return flight to New York, carrying 820 lb. of mail, and 17 of the original passengers; a further passenger was picked up at Foynes. It arrived at New York about 1.0 a.m. on 2nd July, just 31 hrs. 51 mins. out from Southampton.

Pan American Airways hope to fly one passenger and mail service each week.

"*Maia*" Now Used for Training

The flying-boat "*Maia*," lower component of the Mayo Composite aircraft, is now in use at the Imperial Airways school at the Empire air-base, Hythe, as a training-ship for air pilots. The school prepares junior pilots, who act as First Officers, for their full captaincies. "*Maia*" is the first flying boat in Great Britain to be used as a flying schoolroom for pilots training for their First-class Navigator's Certificates. Although she has special equipment for her new station she will still be available, when required, for launching "*Mercury*," the upper component of the composite aircraft.

"Spitfire" Speeds

A Supermarine "Spitfire" single-seater fighter of standard Service type, which is fitted with a Rolls-Royce "Merlin" II engine of 1,030 h.p., recently attained a speed of 367 m.p.h. at 18,400 ft. during official trials at Martlesham Heath with standard equipment. It had a controllable-pitch airscrew, and this is now to be standard for the type. The previous maximum level speed of the "Spitfire" was 362 m.p.h. at 18,500 ft. with a fixed-pitch airscrew.

A specially built high-speed research aeroplane was displayed at the International Salon of Aeronautics at Brussels. It is a development of the Service type of Supermarine "Spitfire" and is known as the "Speed Spitfire." It is of all-metal construction and is powered by a Rolls-Royce special "Merlin" engine, which drives a four-bladed wooden airscrew. Although similar to the Service "Spitfire" the general lines have been "cleaned up" aerodynamically, the pilot's cockpit cover being lowered and streamlined into the fuselage.

* * * *

The new British single-seater multi-gun fighter produced by Martin-Baker Ltd. is a low wing monoplane built of steel instead of the customary duralumin, and is greater in length than in span.

The Koolhoven F K 58

One day last April the people of Waalhaven, the aerodrome near Rotterdam, suddenly heard a high whistle that very quickly grew to a low howling and then died away. This was caused by an aeroplane that shot past overhead, and at about the same moment the radio operator at the aerodrome received a message from Soesterberg, an important Dutch military airport, to the effect that a new aeroplane had just left in the direction of Rotterdam. It had flown the 42 miles from Soesterberg to Rotterdam in about 6 min. so that its speed on this trip must have been about 420 m.p.h.!

It soon became known that this speedy aeroplane was the new Koolhoven F K 58. The F K 58 is a single-seater fighter of mixed construction. In designing it much attention was given to the latest requirements of modern warfare, and it is outstanding for its speed and manœuvrability. It is a middle wing monoplane with a retractable undercarriage. The fuselage is built up of welded steel tube with a fabric covering for the front part, except for the top, where again light alloy is used. The cantilever wooden wing is built up of two box spars with plywood ribs and covering, and is fitted with landing flaps of the balanced type.

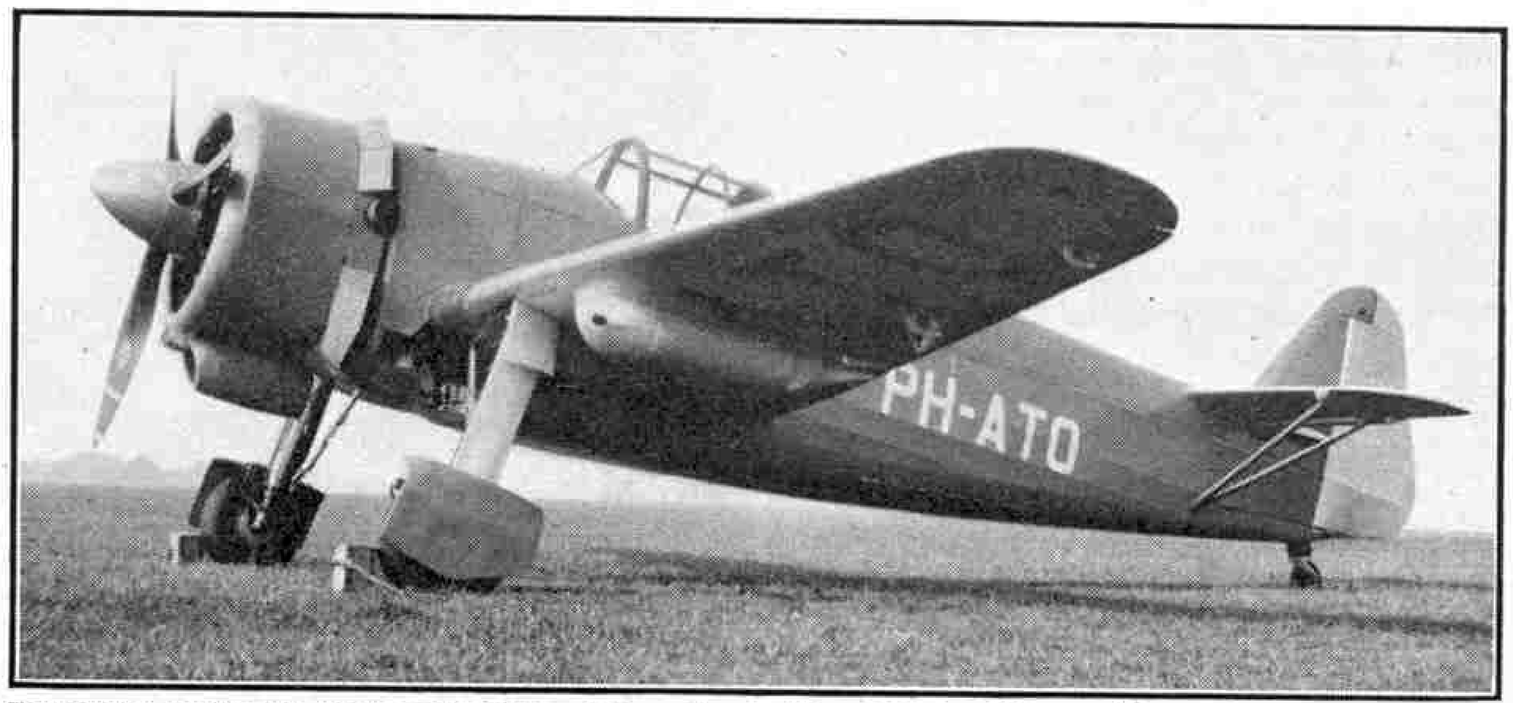
The tailplane is of wood, while the fin, rudder and elevator are of steel tube with dural webs, covered with fabric. The rudder and elevator are fitted with trimming tabs that can be adjusted during flight.

The F K 58 has four machine guns, mounted on both sides of the fuselage, under the wing, and pneumatically operated. A Hispano-Suiza engine of 1,100 h.p. is fitted.

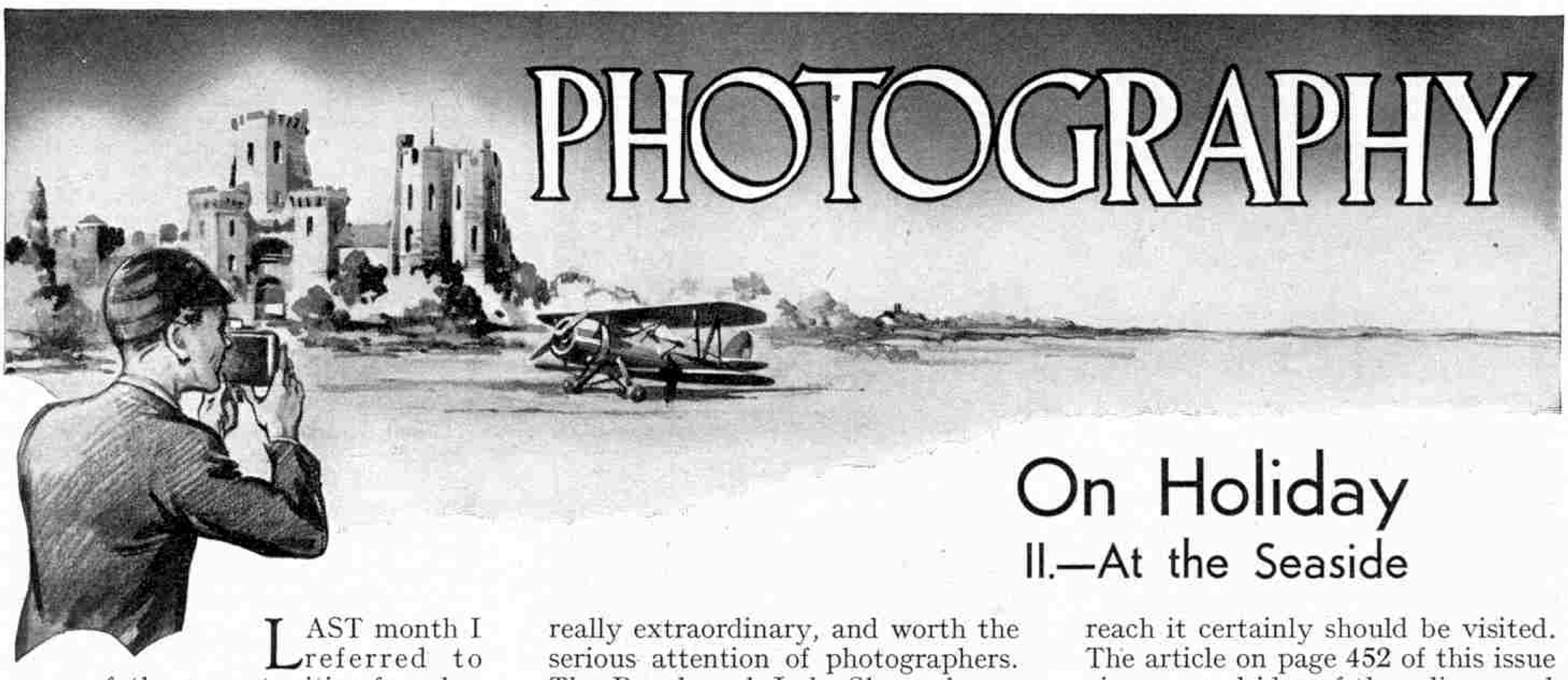
J. I. Dorgelo.

American Flying Boat for R.A.F.

The Consolidated 28-5 twin-engined flying boat purchased by the Air Ministry was flown from San Diego, California, to the R.A.F. marine aircraft experimental establishment at Felixstowe. Only two stops were made during this 5,450-mile flight—the first at Buffalo, where the machine was delayed by bad weather, and the second at Botwood, the taking-off point for the non-stop ocean crossing to Felixstowe, which was accomplished in 15½ hrs. At the end of the flight the flying boat had enough fuel left for another 1,000 miles. This is the first time a military aircraft from the United States has been delivered to this country by air. The Consolidated 28-5 has a range of more than 4,200 miles.



The Koolhoven F K 58 single-seater fighter. It is equipped with a 1,100 h.p. Hispano-Suiza engine and mounts four machine guns in the wings.



On Holiday

II.—At the Seaside

LAST month I referred to some of the opportunities for photography for holidaymakers in the country; this month I give a few suggestions that I think will be of interest to readers who intend to spend their holidays at the seaside. Fortunately most seaside subjects are well within the scope of the cheapest camera, for even when actual sunshine may be absent the light by the sea is usually strong enough for snapshots of all kinds. Don't forget the exposure meter or calculator!

The photographic possibilities at any seaside resort vary greatly according to the locality. Where the coast is wild and rocky, with high cliffs, there is ample scope for striking pictures of a kind that readily suggest themselves. On the other hand, if the coast is low, with long sandy stretches, there will be plenty of scope in the animated beach scenes with their great variety of amusements, and the coming and going of small sailing and motor boats taking holidaymakers for trips or fishing expeditions.

On the beach the best subjects for jolly holiday snaps are children at play. Youngsters usually remain quite undisturbed at the presence of a photographer, and their castle-making and other activities provide good opportunities for amusing pictures. One can generally find children engaged in the time-honoured game of burying somebody under a heap of sand. Snapshots of various stages of this process are always well worth taking. Then there are the donkeys. A collection of photographs of these quaint beasts would be well worth making. The variety of expressions a donkey can put on while he is doing semaphore signalling with his ears is really extraordinary, and worth the serious attention of photographers. The Punch and Judy Show always provides opportunities for snaps of youngsters giving themselves up completely to excitement and laughter; and the bathing and model yacht pools also are sources of good things. When all else fails there are the snapshots of one's friends in holiday mood and attire which, though often the reverse of flattering, are always amusing. At many of the larger seaside resorts there are institutions known as Fun Fairs or Amusement Parks, and these certainly should be visited with the camera ready for action.

Still another source of first-class photographic material is the miniature railway, which takes visitors for short trips. Several seaside resorts now have a railway of this kind, and if one is within the photographer's reach it certainly should be visited. The article on page 452 of this issue gives a good idea of these lines, and of the photographic material they provide. A complete series of photographs of such a railway, its engines and trains, would be really interesting for the holiday album.

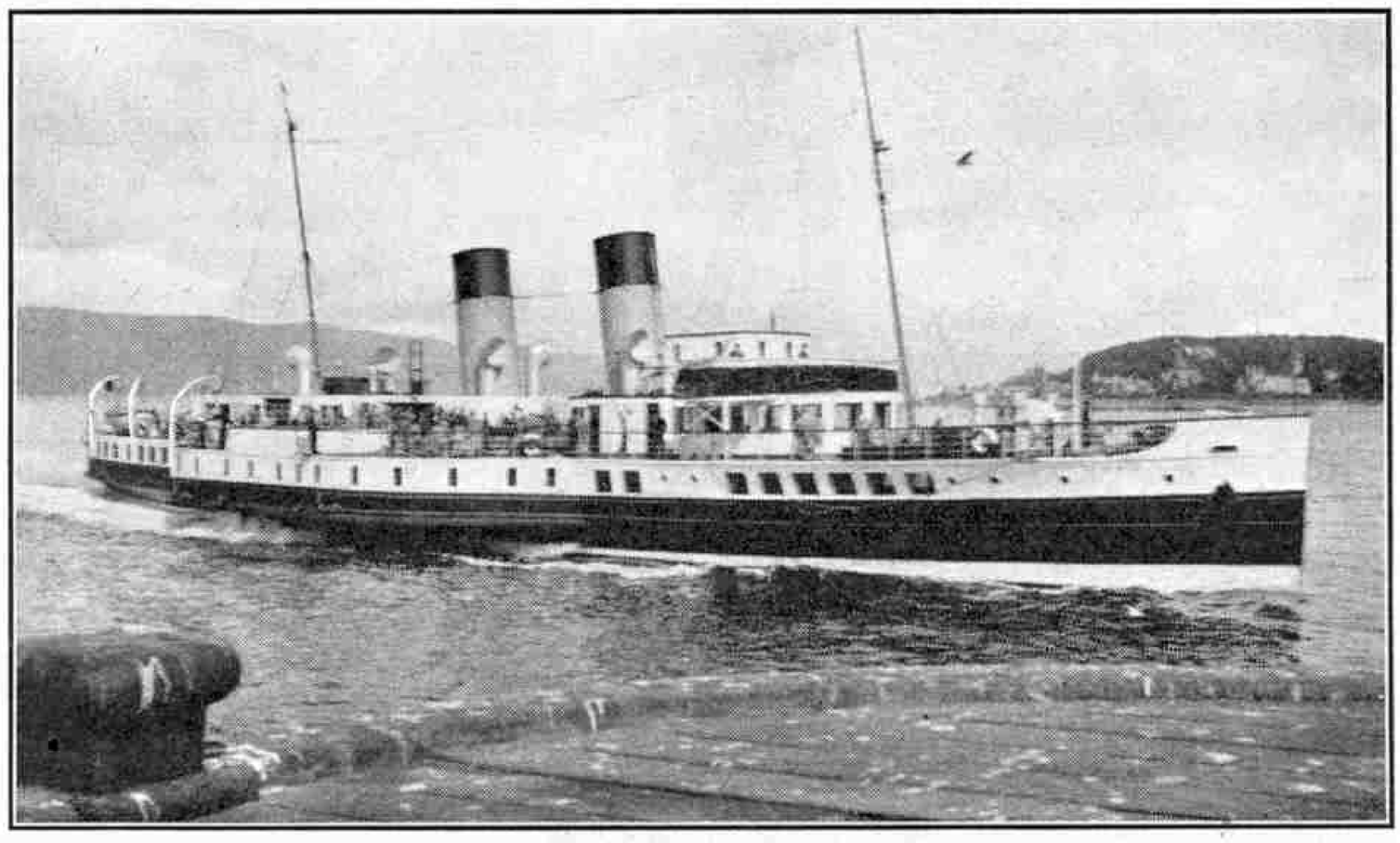
The sea itself offers endless opportunities for photography, but it is remarkable how seldom it is really well depicted, and this is often due to attempting the impossible. For example, a photograph of calm open sea in full sunshine and backed by a blue sky is very attractive to look at, but it invariably makes a poor photograph. If, on the other hand, there are rocks or boats in the foreground, attractive snapshots are easily obtained. The seaside is an ideal place, on account of the low horizon, for securing good cloud photographs. Sunset effects are par-



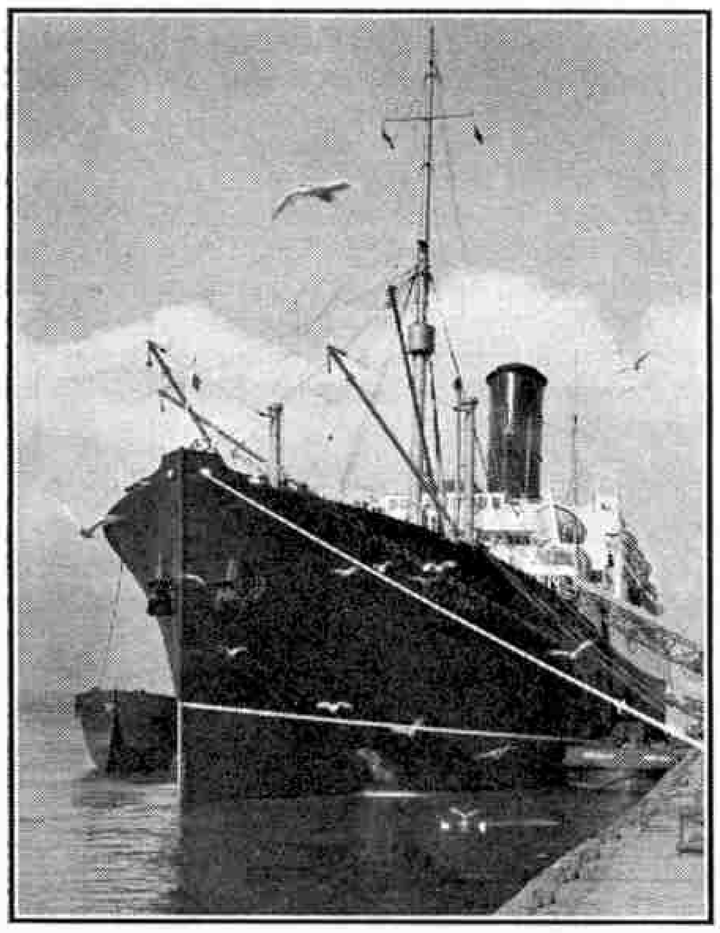
"Sunset." A typical seaside-holiday photograph. It was taken by Ph. Halbwachs, Mauritius.

ticularly attractive and are well worth taking a good deal of trouble to secure. For all work of this kind panchromatic films or plates should be used, with a yellow screen, which should be the one recommended by the makers of the film or plate. One or two boats included in the picture often add a little life and help the general pictorial effect.

Readers are frequently disappointed with their photographs of breaking waves, and judging from the samples that have been sent to me I think the trouble is almost always due to taking the picture from a high viewpoint. For wave photography the camera should be held as low down as possible; the lower it is the bigger will the waves appear to be. One other point is that the camera should not be pointed straight out to sea, but should take the incoming line of waves at an angle. The best



Holiday-makers often have chances to obtain pictures of this kind. It was taken by J. Thompson, Glasgow, and shows the L.M.S.R. steamer "Juno" approaching Wemyss Bay Pier.



This holiday "snap" of a liner at Liverpool Landing Stage is the work of J. Hampson, Edgware.

snapshots of this kind are obtained where there are rocks on which the waves break with a great display of foam. If a really rough sea happens to occur during one's holiday there will be splendid chances of striking pictures. A word of warning is necessary here. Be extremely careful in walking over rocks with breaking waves close at hand; a slip may involve you in serious trouble. It is easy to become so interested in the photographic operations that one becomes careless of where one's feet are moving. The air close to breaking waves is almost always full of moisture, and after use the camera should be carefully wiped dry before it is put away.

Readers who are fortunate enough to be taking a holiday in a small fishing village will find no lack of material for novel and interesting photographs. Small fishing and pleasure boats are generally to be seen along the quay or in the tiny harbour, and usually there are groups of fishermen and others engaged at their daily tasks, which are always fascinating to the visitor. One of the best times for photography is when the fishing boats are coming in and landing their catches; the photographer should then be on the prowl ready to seize good opportunities.

If there is a life-boat, the life-boat house should be watched for signs of activity. A practice provides splendid opportunities for photography. The method of launching varies with different coastal conditions, but it is always interesting and indeed exciting.

Yachts or sailing boats are splendid subjects for the camera, and as a rule they are not difficult to take. Sometimes they may be photographed successfully from a pier, but this viewpoint is really too high, and usually better results are obtained by snapping them from the shore, or best of all from a small boat. A three-quarters bow view gives the best effect. Broadside views may be interesting in their way, but as pictures they are usually ineffective and disappointing. The position of the sailing boat in the picture has a surprisingly great effect. As a rule it should not be in the centre of the picture, although this position is satisfactory for an anchored boat. Otherwise the boat should be just entering the print from one side, or be past the centre approaching the other side. The former position is best for a slow-moving boat, and the latter for one that is sailing at high speed.

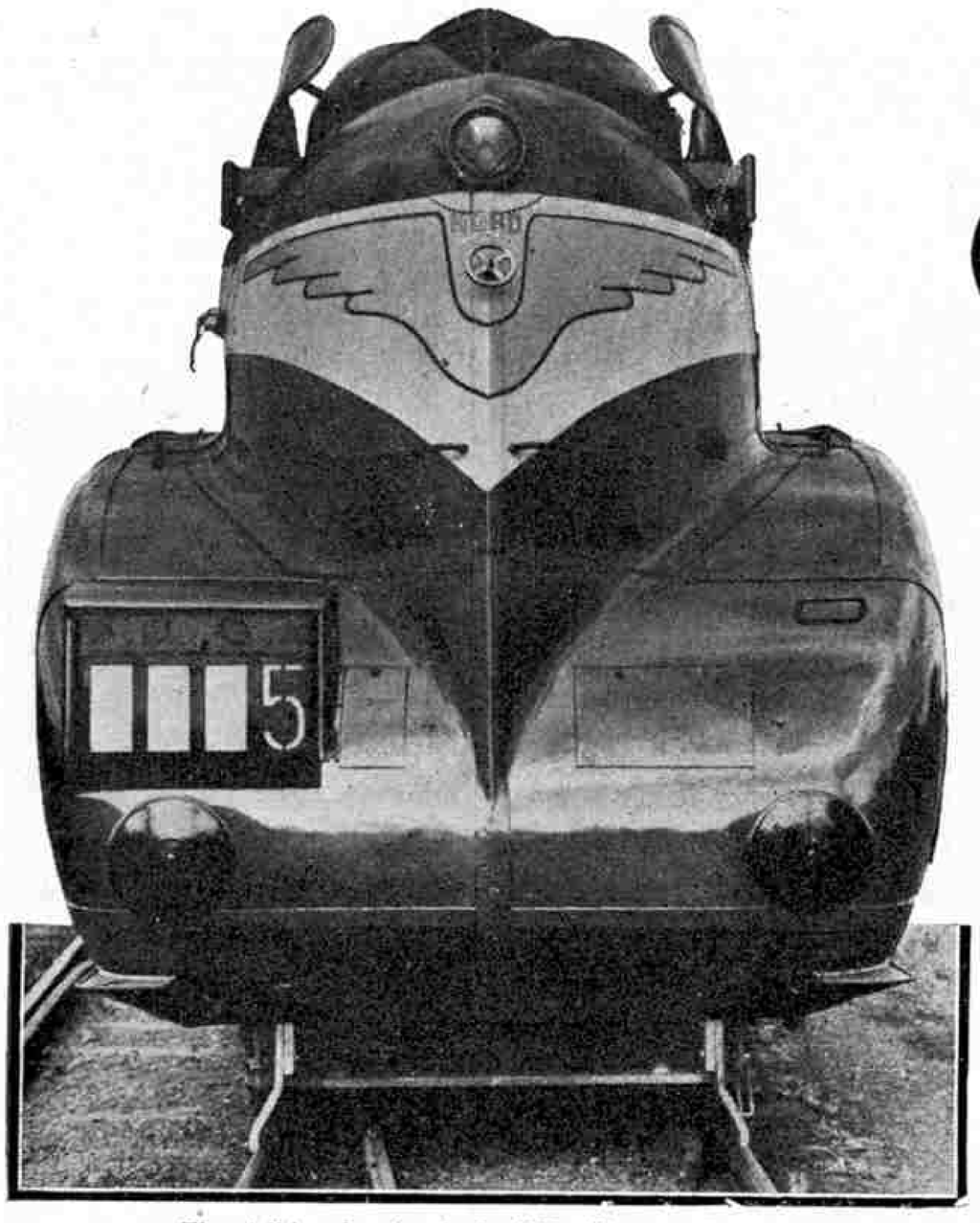
Readers may be reminded here that novel photographs of the shore can be taken from small rowing boats. Usually this kind of photography is only practicable when the sea is very calm; but when suitable conditions occur it is well worth a trial. The photographer should not attempt to take his snapshots while standing up in the boat. Quite apart from the possibility of falling overboard, the viewpoint is too high,



"Learning to be 'Old Salts' "—a fine harbour picture by Miss D. A. Attrill, Bristol.

and it is difficult to hold the camera steady.

Next Month: The Holiday Album.



The striking front end of a "Nord" streamliner.

RAILWAY NEWS

New American Locomotive Giant

The Pennsylvania Railroad have completed the streamlined locomotive shown in the lower illustration on this page and this is now being exhibited at the New York World's Fair. The engine is of novel design, with a 6–4–4–6 wheel arrangement, a leading six-wheeled truck being followed by what are in effect two four-coupled engines with 7-ft. dia. driving wheels. A second six-wheeled trailing bogie supports the fire-box end. Each four-coupled unit comprises two 22 in. by 26 in. cylinders. The working pressure is 300 lb. per sq. in., and the tractive effort is 76,400 lb. at 85 per cent. of the boiler pressure.

A large-capacity tender carried on two eight-wheeled bogie trucks carries fuel and water for this huge locomotive. The wheelbase of each truck is 14 ft., and the empty weight of the tender is 88 tons, which is increased to 201¾ tons when the 23½ tons of coal and 20,200 gallons of water the tender can hold are added. The engine weight is 271½ tons, so that the grand total for the unit ready for service is 473¼ tons.

* * * *

A new all-electric signal box was brought into use at Paddington last month to replace the one destroyed by fire last November.

A Thrilling *"Royal Scot"* Run

Mr. O. S. Nock writes of some remarkable running made recently by the southbound Aberdeen and Edinburgh section of *"The Royal Scot"* after delays costing a loss of 10 minutes. At the commencement of the journey the running was very uniform, but from Stirling the fireworks started and the train, in charge of "Royal Scot" engine No. 6102 *"Black Watch,"* approached Law Junction almost abreast of the Glasgow section of the train, which precedes it to Euston. With a load of 11 coaches, 339 tons tare and 355 tons with passengers and luggage, a fine run was made from Symington to Carlisle, the 66.9 miles being covered in 66¾ min. Beattock Summit was passed at the unusually high speed of 48½ m.p.h.

At Carlisle No. 6132 *"The King's Own Regiment (Liverpool)"* took over for the non-stop run to London. Good steady running characterised the early stages and it was not until late that No. 6132 was allowed to show her paces. The 12.8 miles from Oxenholme to Carnforth were wiped off in 9½ min., an average of 81 m.p.h. that included a sustained maximum of 86½ m.p.h. past Milnthorpe. Normal progress followed to Wigan, but three severe signal checks in rapid succession caused a loss of 10 minutes, so that on passing Crewe only 140½ min. remained for the 158.1 miles home.

The run now became most exciting, for it was evident that the sporty engine crew were determined to make up time. Yet another disheartening check came at Badnall Wharf, just as 79 m.p.h. had been attained on the descent to Stafford, and it was not until Trent Valley Junction curve had been negotiated that the supreme thrills began. Only 115 minutes left to do 133 miles! "Impossible," some would say, but terrific speed followed across the Trent Valley line to complete 51 miles from Stafford to Rugby in 41¾ min. with a maximum speed of 86½ m.p.h. near Tamworth. By a further tremendous effort to Bletchley the driver made a prompt arrival practically certain, this next 35.9 miles taking a modest 29¾ min., including a maximum of 88 m.p.h. at Castlethorpe.

The train was now only a minute late, with 46.7 miles to go, and the rest was easy. The 15 miles uphill to Tring took 12½ minutes, speed falling to 65 m.p.h. at the summit, and the 14.2 miles down to Watford another 11¼ min., so that for the last 17½ miles into Euston the driver had a shade over 20 min. left; easing right up, and judging things beautifully, he brought *"The Royal Scot"* into Euston at 5.14½ p.m., just half-a-minute ahead of time. The 158.1 miles from Crewe had taken exactly 140 minutes, while over the really "flying" stage from Stafford to Watford, 116.1 miles in 95¼ min., the average speed was no less than 73.3 m.p.h. The enginemen responsible for this magnificent run were Driver F. Brooker and Fireman W. Spencer of Camden Shed.

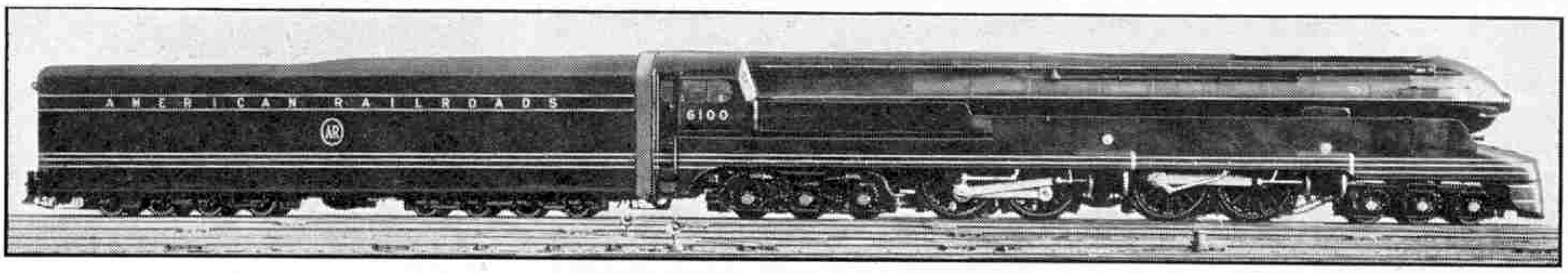
Good Locomotive Work on L.N.E.R.

L.N.E.R. "Pacific" No. 4497, *"Golden Plover,"* recently worked the *"Coronation"* express between Edinburgh and London on 38 out of 39 consecutive working days; on the 39th it was employed on a different schedule. In 38 days the distance travelled was 14,924½ miles, at an average speed of 65½ m.p.h., and at least 12,000 miles were covered at 80 m.p.h. or more.

After this tremendous turn of duty the engine appeared to be in perfect order and was taken off the schedule only because it was due for periodical examination.

Longest Colour-Light Installation in Great Britain

When completed the new colour-light signals now being installed on the East Coast main line between Northallerton and Darlington will control working over a distance of 42½ miles, the longest stretch covered in this manner in Great Britain. The signals are of the "searchlight" type, giving four indications to the high-speed expresses using the East Coast Route between London and Scotland.



The new Pennsylvania locomotive at the World's Fair. Illustration by courtesy of the Committee on Public Relations of the Eastern Railroads.

L.M.S. 4-6-2 at Prestatyn

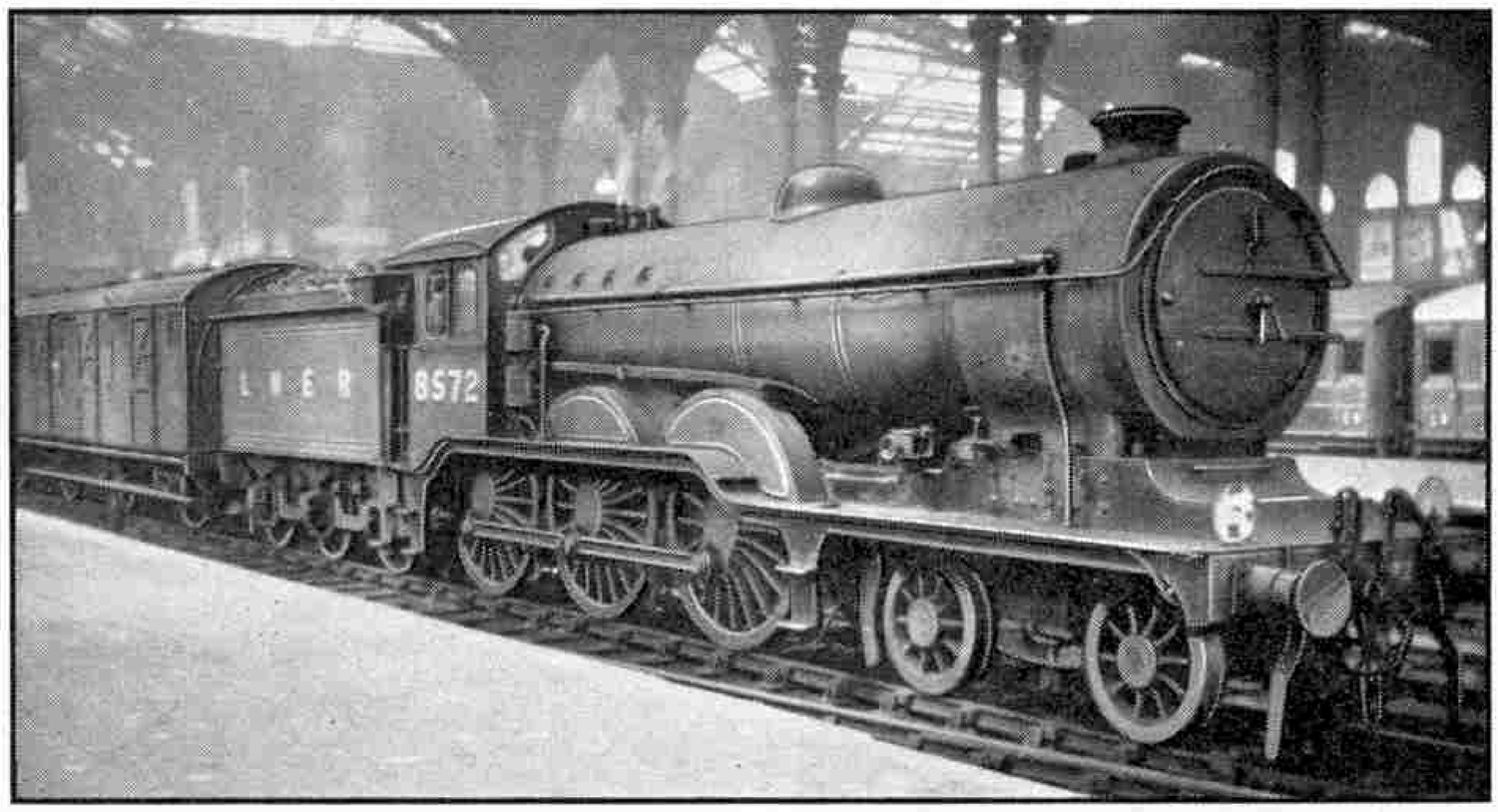
The first working of a 4–6–2 engine to the North Wales Coast, apart from test trips carried out between Crewe and Holyhead, took place in June when No. 6227, *"Duchess of Devonshire,"* worked a special from Euston to Prestatyn and back in connection with the official inspection of Prestatyn Holiday Camp. On the return trip the train left Prestatyn 9 min. late, but arrived at Euston on time, the final 82½ miles from Rugby being covered in 78½ min. start-to-stop, including a 20 m.p.h. signal check at Bushey. Maximum speed was 81 m.p.h. and the load 460 tons gross. Driver Drury of Crewe was in charge. D. S. BARRIE.

New L.M.S. "Streamliner" in Service

The L.M.S. have put into traffic, following its completion at Crewe Works, No. 6235, *"City of Birmingham,"* the first of the 20 new streamlined 4–6–2s that are being constructed and which are to be named after cities on the L.M.S. system. These engines weigh 164 tons, and are nearly 74 ft. long. Their tenders hold 10 tons of coal and 4,000 gal. of water, and they are painted the standard L.M.S. red with horizontal gold bands.

Demolition of a Railway Landmark

The suspension Bridge that connects Crewe Station with the L.M.S. Locomotive works is being demolished to make way for the reconstruction of Crewe North Junction Signal-box. The bridge had become familiar to thousands of rail travellers as a lineside landmark of unusual interest. It was known locally as "The Spider," and was built in 1878 for the conveyance of stores from the works to the station. Its full length was 720 ft. and it consisted of a 220-ft. suspension span, supported on lattice towers 45 ft. above rail-level, and 15 lattice-girder spans. Formerly a narrow gauge track was laid on it and over this ran a 2½-ton locomotive called *"Tiny"* that with its two trailer wagons used to be an object of great interest to travellers.



L.N.E.R. 4-6-0 No. 8572 at Liverpool Street. This is one of the Great Eastern type 4-6-0s now provided with a larger boiler than that originally fitted. Photograph by W. P. Conolly.

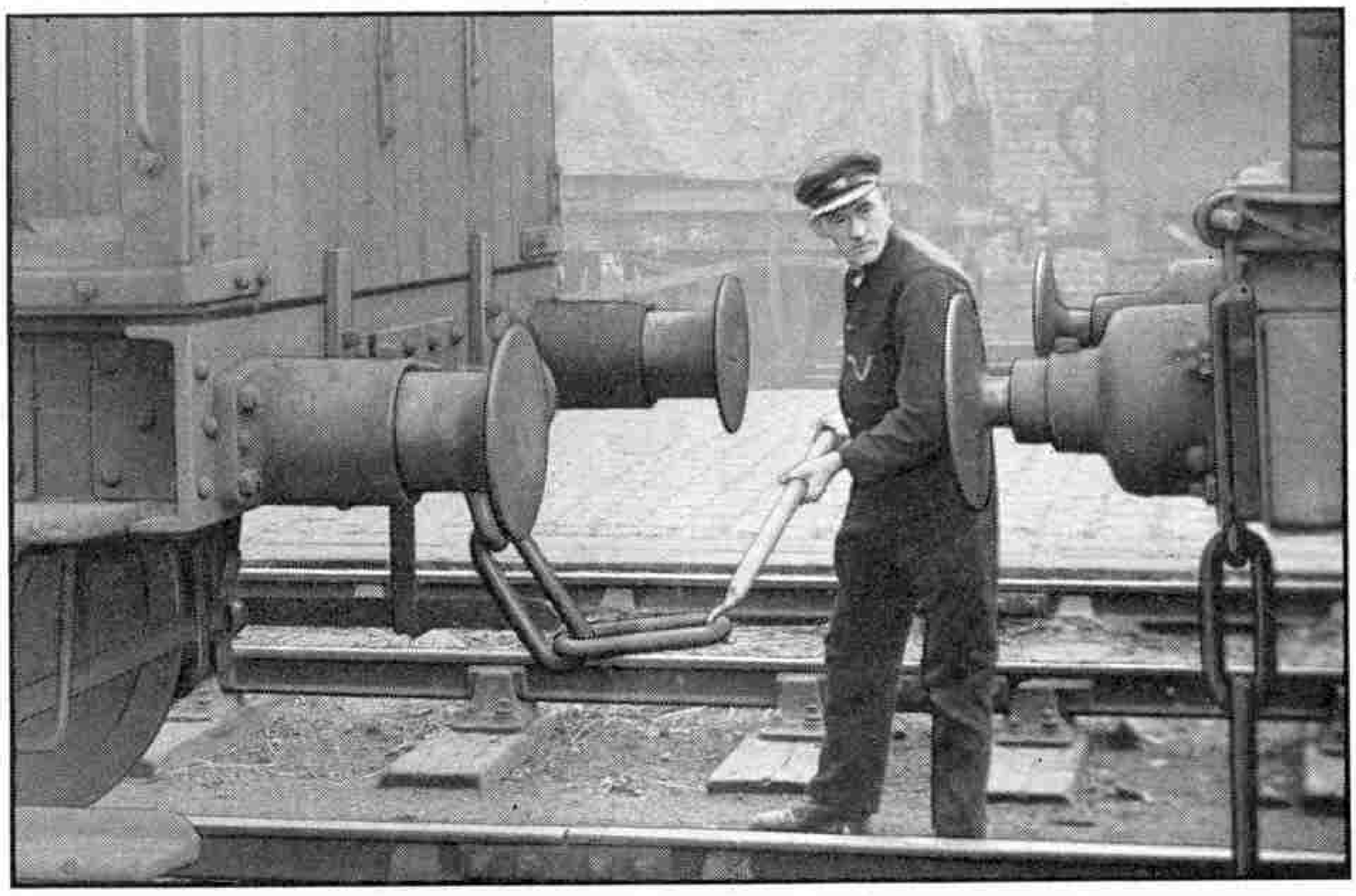
"Tiny" was withdrawn from service some years ago, and the bridge has since been used as a footway for L.M.S. employees and as a support for several cables. The demolition involves the removal of 130 tons of ironwork and the work is being carried out with an absolute minimum of interference to rail traffic.

An Unusual Combination

An interesting instance of two types of G.W.R. tank engines double-heading a main line 11-coach excursion train was noted at Newport High Street recently, when a schools' excursion from Aberdare to Clifton Down came in with 0–6–2T No. 6655 piloting 0–6–0 pannier tank No. 5796, going forward with 7308. D. S. BARRIE.

L.M.S. Observation Cars in North Wales

Specially constructed observation cars with large side and end windows giving an excellent view of the scenery are attached to the rear of certain L.M.S. trains in North Wales in the summer. Passengers who use them pay a small supplementary charge.



Coupling up; an operation that never fails to interest onlookers. Photograph by G. Thornton, Southport.

The cars are 57 ft. long and each seats 72 passengers. They run between Llandudno and Blaenau Festiniog via the Conway valley and Bettws-y-Coed; Rhyl, Llandudno and Llanberis via Conway, Bangor and Caernarvon; and Llandudno and Holyhead via the Menai Bridge. An official conductor travels in each car to point out beauty spots.

Locomotive Names in Northern Ireland

K. Gourley of Carrickfergus, Northern Ireland, writes to say that the N.C.C. 2–6–0s Nos. 90–100 are named *"Duke of Abercorn," "The Bush," "The Bann," "The Foyle," "The Maine," "The Braid," "Silver Jubilee," "Earl of Ulster," "King Edward VII," "King George VI"* and *"Queen Elizabeth"* respectively.

L.M.S. Shock-Absorbing Wagons

Following the success of the special shock-absorbing freight wagons, first introduced by the L.M.S. last year as an experiment, it has been decided to construct a further 300 of these vehicles, bringing the total up to 506. The wagons will be of two types, 250 with hand-brakes and 50 of the vacuum-braked type, the latter being suitable for running on the fastest freight trains. They will all be of 12-tons capacity.

"Southern Electric" Progress

Last month saw the commencement of public services on the extension of the S.R. electrification between Gravesend and Gillingham, Strood and Maidstone West, Swanley and Rochester and from Otford to Maidstone East. This marks the final phase of the five-year electrification plan undertaken with Government assistance. The lines now electrified comprise a total of 702 route miles, or a total track mileage of 1,746. There are 3,189 electrically-operated coaches, and current is fed to the railway through 158 sub-stations.

New rolling stock has been built for the new and improved services that have been introduced, the basic train unit being a two-car set. Trains of eight cars are operated at peak periods, and on special occasions it is anticipated that trains of up to 12 cars will be run. The new train services have been accelerated as compared with the steam services previously maintained, and the usual standardised times characteristic of "Southern Electric" services are observed. Track and station improvements have been carried out to allow the greatest benefit to be obtained from electrification, and signalling arrangements also have been revised to meet the new conditions.

HOW THINGS ARE MADE:

A Visit to a Felt Hat Factory

WE all wear hats, and they are so familiar to us that we take them for granted. Yet they are full of interest, and to see a hat made is to gain a new respect for head coverings in general. Hats are worn chiefly for protection from the weather, either from the overpowering rays of the Sun, as in tropical countries, or from rain, snow and sleet in colder parts of the world. They have given such splendid opportunities for the love of finery that practically all of us possess, however, that their use has gone far beyond the original purpose. Ceremonial hats, often of very elaborate character, have been introduced, such as the wonderful feathered headdresses of the North American Indians and other curiously decorated coverings.

It would be difficult to find any article of clothing that has undergone more changes in form than the hat. In early times a simple hood sufficed. Later a brim was added, and since then there have been amazing variations in the height and width of the crown, in the extent and shape of the brim, and in the use of hatbands, feathers and plumes to add ornament. Materials also have changed remarkably at various times. Ordinary cloth and velvet, plush and other elaborate materials have been used for making them. In this article we describe the making of the type of men's hat that is most popular to-day.

The production of this kind of felt hat begins with noils, as they are called in the wool trade. These are produced in the preparation of wool for the production of cloth, and consist of the shorter fibres separated from the longer ones during the combing processes. They are thoroughly cleansed from bits of vegetable material of all kinds that are picked up by the fleece of the sheep as they graze in the meadows and over downland, and reach the hat manufacturer in the form of fine white wool, resembling cottonwool in appearance.

It is difficult to imagine that this light fluffy material can be transformed into a hat, and the first step in the process as seen by a visitor to a hat factory increases the wonder. The wool is fed into a machine in which rollers teaze it out, changing the flocculent material into a web in which the fibres are pulled out to lie more or less parallel to each other. The final straightening is the work of the "card," as it is called. This is a mat of fine wire wrapped round a cylinder, and in its meshes the fibres are formed into a thin web about 2 ft. wide, which falls away from the carding cylinder in a fragile continuous sheet.

As the web issues from the machine it is wound on a wooden former in the shape of two cones joined at their bases. This double cone rotates slowly, and as it does so it swings first to one side and then to the other, so that the outcoming web is wrapped over each half alternately, the attendants pressing it gently with their hands to complete the wrapping. When sufficient wool has been wound on to make two hats it is cut into two cones by means of a pair of shears and the web is broken. The woollen cones are then quickly removed from the former, over which the web again is wound, so that the process goes on without interruption.

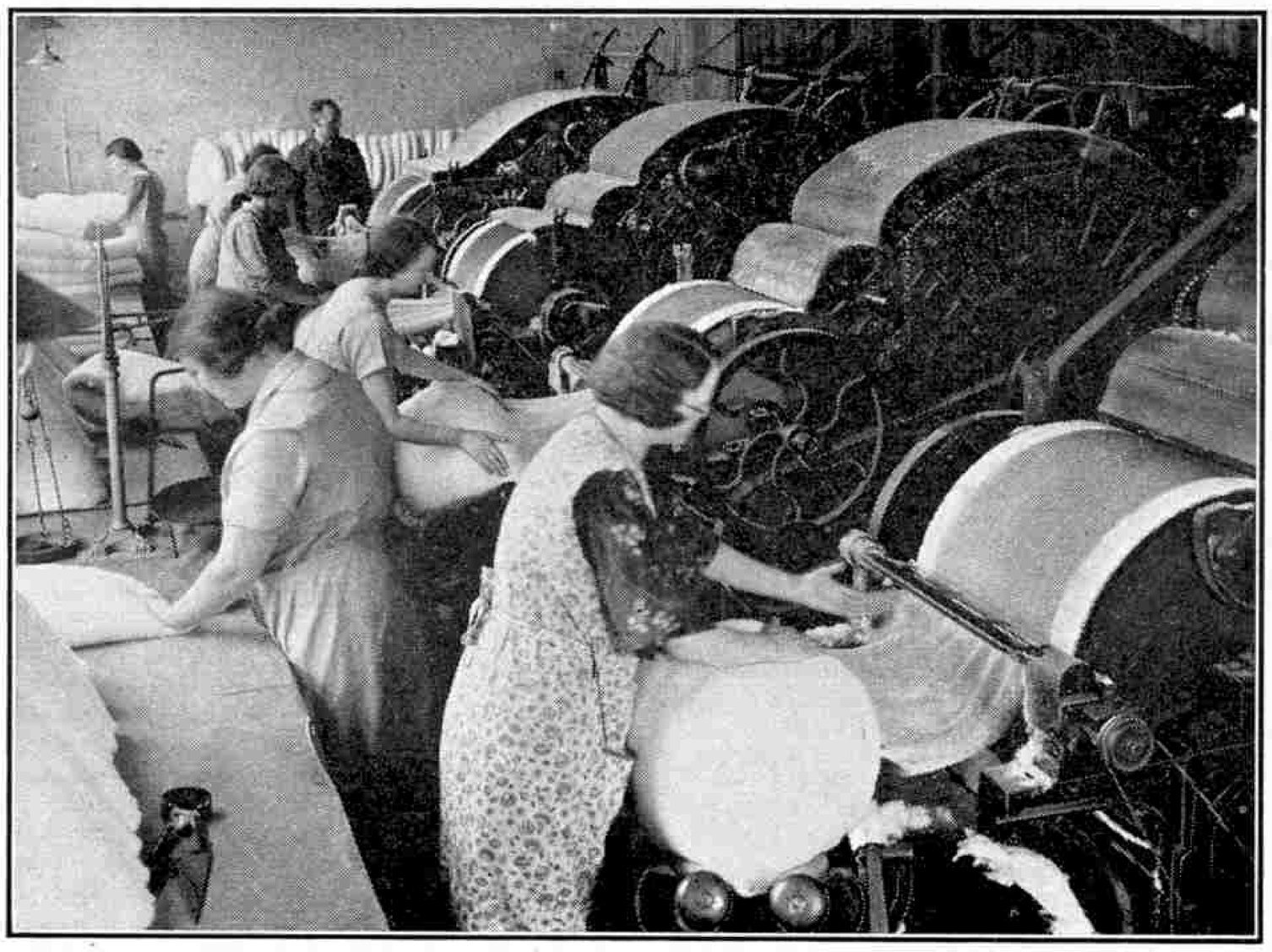
In some mysterious manner the operators gauge exactly the right amount of wool to form two hats on the double cone, and the worker who checks their estimates by weighing the large cones of white fluffy material that result from their activities seldom has any complaint to make. The hatmaker calls these cones "hoods." Each is about 2 ft. high and 18 in. across at its base, and weighs only a few ounces; but the material is so light that its thickness is considerably more than an inch. In shape it resembles a dunce cap, except that its diameter is larger in comparison with its height; and it is not easy to see how it can be given the shape of the modern felt hat.



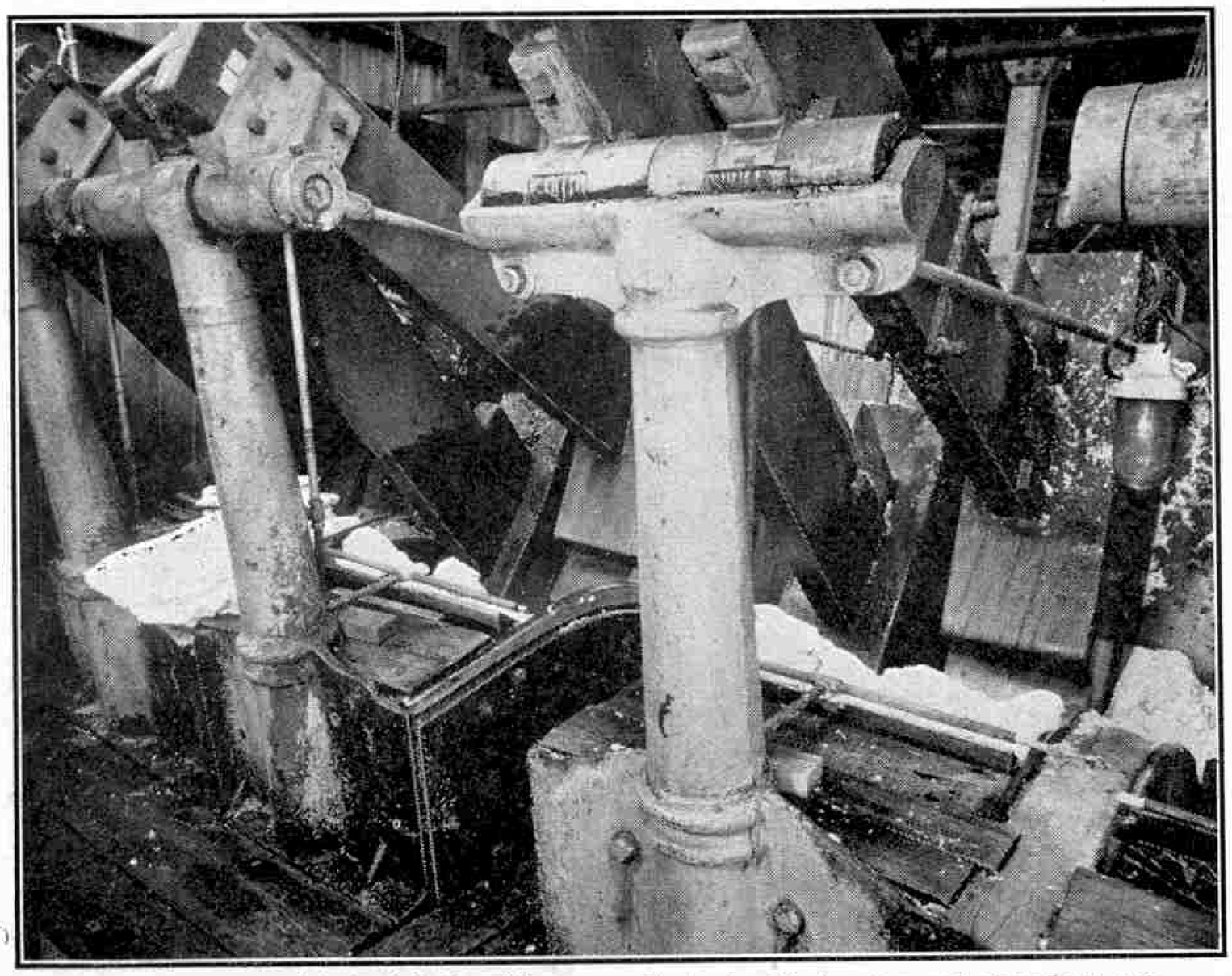
Hardening the fluffy cones by vibratory pressure in steam. The tip is treated first.

This brings us to the real mystery of hat making. The hood in its original form can easily be torn to pieces, but if its fibres could be entangled and interlocked with each other they would offer resistance to pulling apart. How to bring about this change has been known for centuries. Tradition ascribes the discovery to monks who, on long journeys across the sandy deserts of the East, were accustomed to place wool in their shoes to make walking easier. The slight movements of their feet backward and forward in their shoes rubbed the wool under pressure and so caused the fibres to become entangled with each other. The perspiration from their feet helped in this felting process, as it is called, and to-day the hat manufacturer makes use of moisture in conjunction with pressure and a rubbing movement to transform his fluffy cones of wool into a strong and resistant material.

Felting has to be carried out in stages if it is to be effective, and the processes must begin with gentle rubbing, leading eventually to more vigorous and almost brutal action. The hood undergoes its first felting, or hardening, as it is called, in a machine that charges it with steam to supply the necessary warmth and moisture to keep the material pliable. The point is treated first. The hood is dropped over a metal shaping cone, and as it is steamed a small disc is pressed lightly on the crown and vibrated rapidly so that it felts the material in contact with it. At the same



Winding carded wool on formers to produce the cones that are the earliest stages of a felt hat. The illustrations to this article are reproduced by courtesy of the Denton Hat Company Ltd., Denton.



The hammers that pound the hoods in the milling process. The heads of the hammers weigh about 5 cwt. each.

time the point of the hood is flattened.

The reason for this preliminary operation is seen when the rest of the material is felted, for the cap is pressed under a wooden slab with rounded edges that vibrates rapidly as it is pressed down on the wool, which is steamed all the while. Up to the moment when the hood is placed in this machine it is fragile and must be handled very gently in order to avoid pulling it to pieces. The effect of the steam and the pressure, combined with the movement of the wooden slab, is to interlock its fibres and to reduce the thickness of the material, which is given the appearance and feel of a thick coarse blanket. During its stay in the machine the hood is so folded that no hard edges or creases are formed.

Next the hood is subjected to more violent treatment. It is first pushed through fluted wooden rollers, with hot water dripping on it, and when it emerges it is folded and thrown into a vat where it is again soaked in hot water while huge wooden hammers pound the mass continuously. The head of one of these hammers weighs 5 cwt. and is pivoted on a wooden arm about 5 ft. long. Huge wheels with four wooden cams spaced round their rims raise the hammers and allow them to fall, and the hoods are continually being turned over as they are beaten, for the hammer heads have wedge-shaped points that penetrate under the mass, leaving the hoods on top without support so that they topple over.

As the hoods are dropped into the vat they are folded in a peculiar manner that prevents the formation of creases, and after being pounded for a few hours they are taken out and refolded before being returned for a further two hours of torture. When they are released the fibres are more firmly entangled, and they themselves have been reduced in size to something like that of an ordinary hat. As yet they have no shape or colour, and it is at this stage that the dyeing operation takes place. This is comparatively simple. A huge vat containing the dyestuff, green, brown, or whatever it may be, is heated almost to boiling point by blowing steam through it, and the hoods are dropped in. A pump circulates the liquid so as to drive it through the material, and the contents of the vat are continually stirred.

Even now the felting is not complete, for yet another stage is carried out in the process that produces a hood of the right size and shape for the blocking operation. What looks like a rolling pin is used for this purpose. Unlike that used in the bakehouse it tapers off at each end, and the operator rapidly runs it over the wet hood, which he continually lifts and turns to avoid producing hard edges. Pressing on a shaped wooden block follows, and there the hood is moulded and pulled down to give it the requisite height.

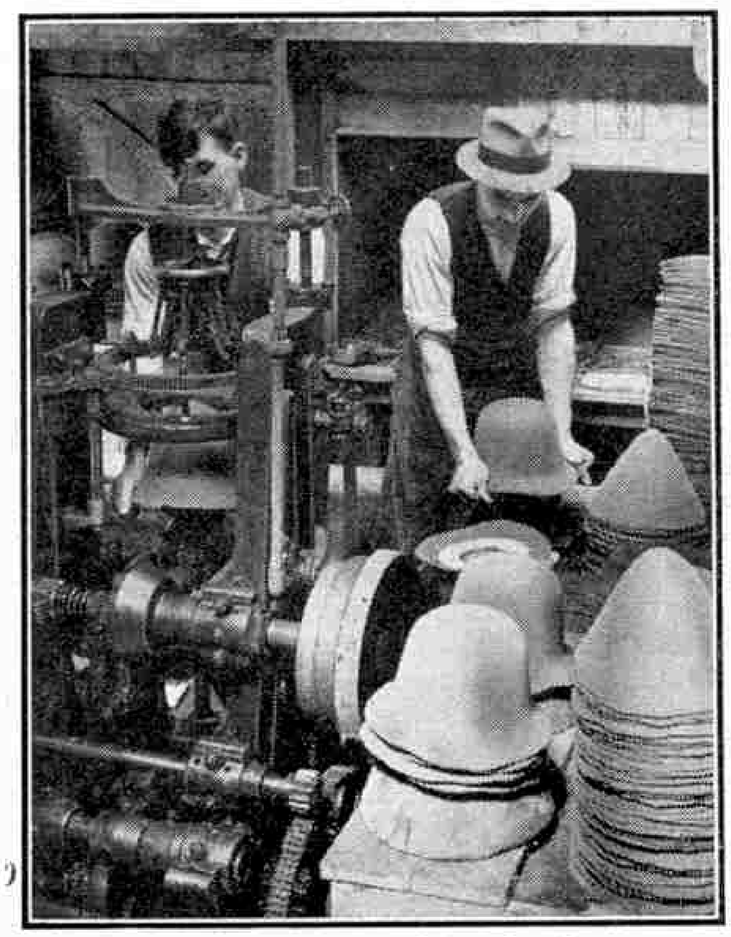
In between certain of these operations the hood is dried, a process that has to be carried out slowly and without the application of excessive heat. The fibres of the wool seem to resent the treatment they are receiving, for they are continually trying to revert to their original condition. Quick drying under the influence of heat would encourage them in this, and the hoods would rapidly become shapeless masses as a result. The hat maker now takes a further precaution against this tendency by dipping his material in "proof," a liquid containing shellac, borax and water. The amount of proof taken up is carefully regulated, the excess after dipping being squeezed out by rollers. The brim requires a little more strengthening than the crown, and the edges of the hood therefore are given a second coating of proof by spinning them between rollers containing the liquid.

Steps can now be taken to give the hood something of the shape of a hat. Once again steam is used to make the material pliable—almost from start to finish of its career in the works a hat lives in steam—and the hood is placed in a mould, and pressed over a block that gives it a rounded shape. The block with the hat on it is quickly turned over and dropped in a frame, in which it is left for a short time to cool and set to shape, the weight of the block on the crown helping to give the right effect. This is followed by the action of a machine that presses the sides of the crown, and the edges are turned up so as to form the beginning of the brim.

Now at last the hat can be shaped, and it is blocked to give it its size, which is marked on the inside with chalk for the guidance of the finishers and packers. For each size there is a special block, and after the crown has been shaped the brim is pressed to felt it further and to give it extra strength and stiffness.

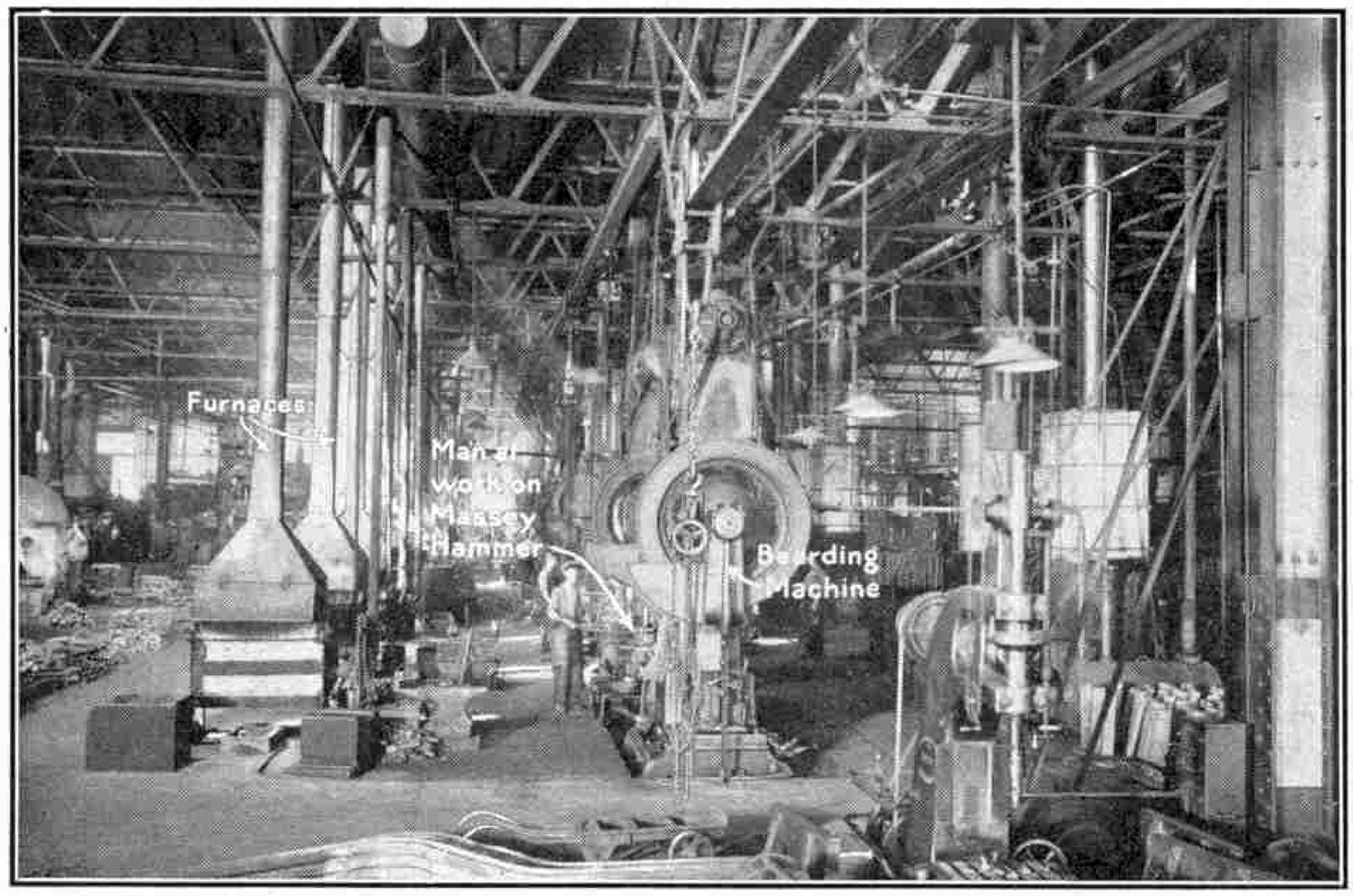
Many operations still remain to be carried out to give a hat its correct appearance and fine finish. It is rubbed down with fine sandpaper and whirled between sanding wheels that smooth off its rim, and is pressed on blocks of various kinds that give the final touches to the shape and set of the crown. It is placed on an elaborate jig while a sharp knife runs round in a guide to cut off unwanted felt and to give a good edge to the brim, which is shaped while warm and moist by the pressure of a bag of sand in a special mould. At every stage it is carefully steamed, and a close watch is kept on the sizes of the blocks used, for these are liable to shrink or expand, and even changes in the weather may cause serious alterations. All that remains is to add the hat band and the circlet of leather inside the crown, and the hat, which is carefully inspected several times during its progress through the works, is then ready for packing and despatch to the hat shops. The packing is done as thoroughly and carefully as any process in making the hats.

Fashions change in men's hats to a surprising extent, and modern hat makers, such as the Denton Hat Company Ltd., in whose works near Manchester I saw



Stretching the tips of the hoods to give the necessary rounded shape.

these operations in progress, devote more and more time to designing a hat to give a neat and well balanced appearance to its wearer. Yet the fundamental operations remain the same as they have been almost for centuries, for hat making is a craft with a history and traditions that still govern the customs of the trade.



In the stamping shop at Swindon. The illustrations to this article are reproduced by courtesy of the G.W.R.

Mechanical Forging in Railway Workshops

By F. G. Richens

FORGING is the shaping of a mass of heated metal by hammering, and probably the most familiar example of such work is the making of horse-shoes on the blacksmith's anvil. More intensive production of this kind on a larger scale is carried out mechanically by steam hammers and stamps, and mechanical forging has undergone a process of steady development in recent years. In railway workshops, as elsewhere, the steam hammer and the stamp are now responsible for many jobs that for years were regarded as coming within the province of the smith, and at the Swindon works of the G.W.R. alone mechanical forging appliances have a weekly output of 32,000 articles.

The steam hammer forms one of the most direct forms of power forging, the metal being worked under the hammer in the same manner as horse-shoes and other small articles are forged on a hand anvil. The weight of the hammers used at Swindon varies from 25 cwt. to 5 tons, and typical examples of the locomotive work they turn out are connecting rods, coupling rods, extension frames and brake gear.

A brief description of the forging of a locomotive connecting rod will give a good idea of the methods adopted. This work is carried out on a 4-ton hammer. Big hammers of this kind consist of a high frame with legs so arched over the anvil, or lower block, that the hammer crew can get all round the metal while it is being forged. The blow, of course, is dealt by the steam-driven upper block, its power being one hundred times the weight of the block.

Connecting rods are made in pairs, a "bloom" or bar of metal measuring 6 ft. by 12 in. by 10 in. containing enough metal for two rods. The bloom is first marked in the middle. Then the half that is to form the first rod is heated and swung from the furnace to the lower block in the chains of a hydraulic crane. The forgeman instructs the hammerman as to the force of the blows, which may vary from 400 tons to a light pat. He directs his men in the moving and adjusting of the hot metal on the block, and manipulates the swages and tools to "work" the metal.

The first process is to hammer out the centre length of rod to the correct tapering thickness, after which the head is shaped by the use of different hammer blocks and tools. The same process is then carried out on the other half of the bloom, thus leaving the gang with two partly-finished rods, joined in the middle. The rods are separated and the inside ends shaped; and the original 6-ft. bloom has then been converted into two shapely rods with a total length of three times 6 ft.

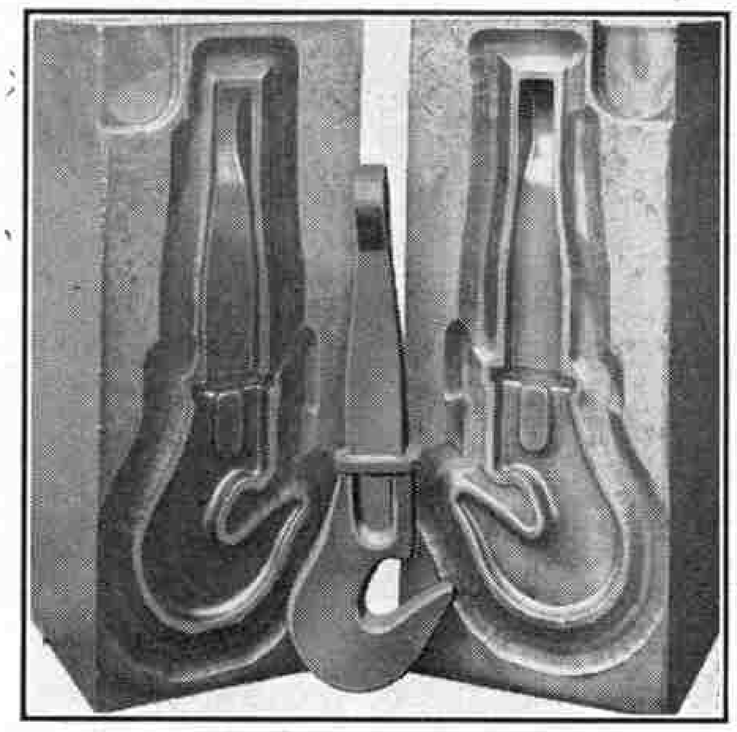
The drop stamp is a further development of the steam hammer, in which forgings, even of considerable intricacy, are produced by means of straightforward blows. The difference is that the metal is forced into the shape imposed by dies fixed to the blocks of the stamp, not by the manipulation of the metal under the hammer as just described. A good illustration of the stamping principle is that of the two halves of a walnut shell pressed on a soft substance. Among the stampings turned out at Swindon are rocking shafts, horn cheeks, brake hangers and slippers for piston crossheads, all of them intricate locomotive jobs.

The preparation of dies for stamping, and for the other processes to be described, is a difficult and important undertaking. The man responsible for it, the chargeman die-sinker, is a key man. He works from a drawing and, if necessary, a wooden model of the article required. He must visualise the finished article in two parts, one to be worked into the top die and the other into the bottom one, and he marks out the blocks ready for sinking. Steel blocks are generally used for dies, although cast iron, reinforced by a girdle of mild steel, will sometimes be used if the type of product does not justify the expense of steel.

The actual die-sinking is partly a mechanical and partly a hand process. If a considerable quantity of metal has to be taken out of the block, the machinists are required to slot and plane and bore it until the pattern has been roughed out. Then the block, which sometimes weighs as much as two tons, returns to the die-sinkers. It is mounted on a basin-shaped block of metal known as a "cushion," which is poised so as to swivel as required by the die-sinker. The die is then finished off with pneumatic or electric grinders and hand tools.

There is now a machine installed at Swindon that carries out the entire preparation of many dies automatically. The machine is electrically driven, and is so intricate in design that seven electric motors are required to operate it. The machine is devised to work either under the management of an operator or automatically. For automatic working a wooden model of the die required is fixed in position, and when the machine is set in motion it produces an exact replica in metal. A finger-like pointer feels its way over the surface of the wooden pattern, starting at one end and working to and fro until it has covered the whole surface. The light pressure of the finger against the pattern gives an electrical contact, and this is conveyed to the mechanism that controls the movements of the table on which is mounted the die block to be machined. By this means the movements of the table are regulated according to the pointer's exploration of the pattern, and as the face of the die on the moving table is brought against a fixed milling cutter, the declivities on the original are reproduced in the metal copy, correct to 6/1000ths of an inch.

When the dies are completed a wax impression is taken and if this is satisfactory they are passed for service on the stamps. At Swindon both drop-stamps and Massey-type steam-driven stamps are in use. The

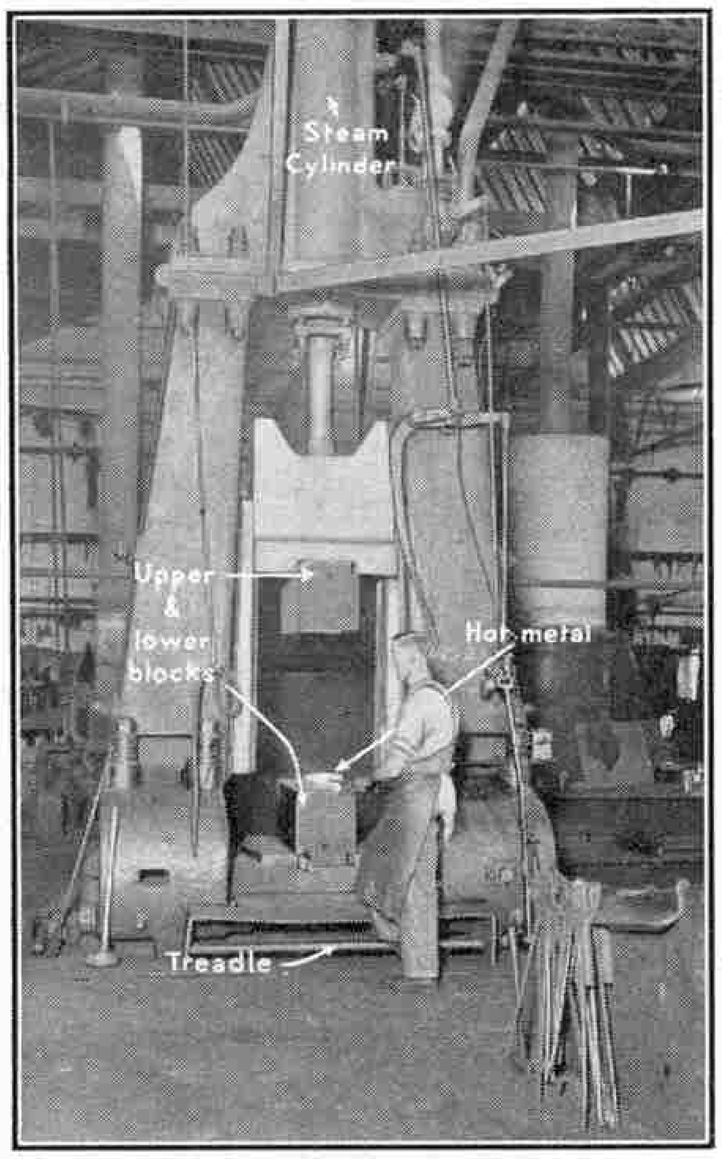


A pair of drawhook dies and their product.

largest of the drop-stamps is 24 ft. in height and consists of a heavy metal frame in which are the two blocks, the bottom one being fixed to take blows from the other, which works up and down in vertical guides. The upper block is lifted for the drop by steam or electrical power. The dies are fixed to the blocks by means of tongues wedged by metal keys into corresponding slots.

For drop stamping, the metal is heated in coal-fired furnaces that develop a temperature of approximately 1,500 deg. F. It is removed from the furnace by means of special tools and placed on the lower block. The upper block is then lifted to the top of the frame and allowed to drop on to the metal, the process being repeated several times until the stamper is satisfied the job is finished. The metal forced out of the dies by the pressure forms a "beard" round the edge of the finished article, and this is pared off by the use of a bearding tool.

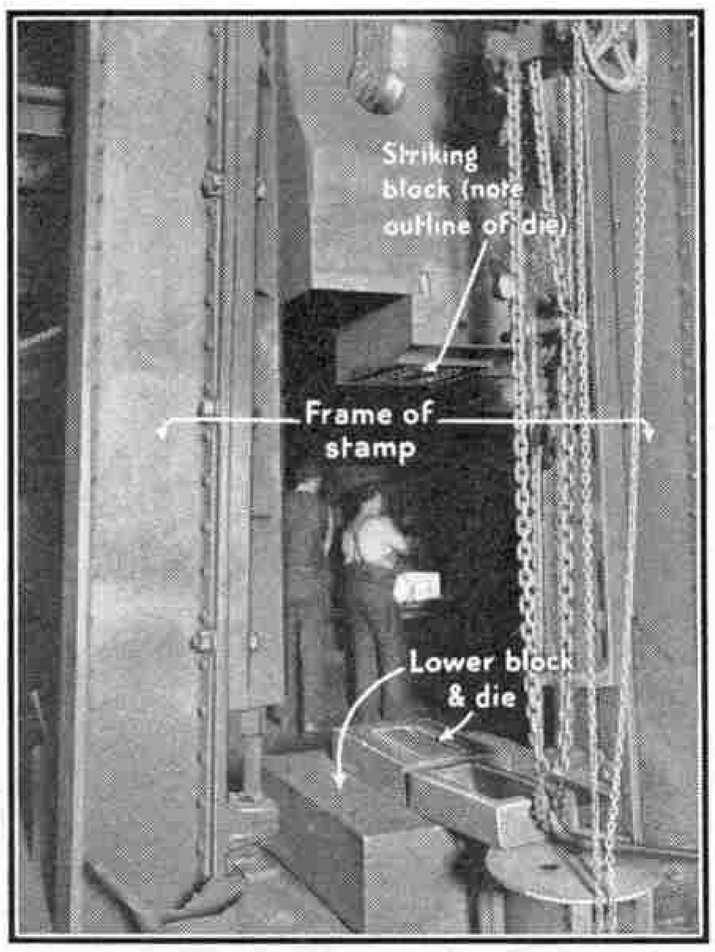
A battery of nine Massey hammers is employed at Swindon. These combine the principle of the stamp with that of the steam hammer for, although dies are used to shape the metal, the force of the blow is derived from steam power. A Massey unit consists of the hammer, the furnace and the bearding machine, and requires only one man for its operation. One of these useful units is shown in operation in the illustration below. The operator takes the metal from the furnace, works it under the hammer while controlling the blows with a foot treadle, and then finishes off the operation by



A Massey steam hammer. It is controlled by the treadle operated by the hammerman's foot.

doing any necessary bearding, cutting or punching on the bearding machine.

Another interesting type of machine that is playing an increasing part in railway work is the forging machine, or "upsetter." Machines of this type are engaged mainly in producing light forgings from bar metal, particularly those involving a shaped head. Buffers for engine tenders, draw bar pins, piston rod nuts and



A 4-ton drop stamp. The men in the background are removing a glowing billet from a furnace.

spindle piston valves are good examples of this class of work. The upsetters differ from any of the machines previously described in that they employ pressure, and not blows, to carry out their forging. In operating them the metal is inserted between two jaws, which hold the dies. When the foot treadle is depressed the jaws close laterally with a 500-ton bite and force the metal into the desired shape; before they release it a third die advances from the throat of the machine on to the end of the metal and shapes the head.

A 200-ton electric press is another modern machine used by the Great Western Railway. In its operation an electric motor turns a crank and thus imparts a rocking motion to the upper shaft. By coupling this to a second shaft, which is controlled by vertical guides, the up-and-down drive necessary for the press action is obtained. The machine does its work by means of dies, the power and nature of its action enabling it to do very fine but speedy work. A good example of one of its jobs is a split nut for use on carriage bogies; not only the nut itself, but the screw thread is pressed out by the machine. The manufacture of back plates for brake blocks, a cold metal job, is a good example of its mass-production capabilities. Strips of metal 18 ft. long are fed into the machine from the front, the operator moving the strip forward as each action presses out its back plate. A second man stands behind the machine and stacks the plates on to a bogie as they slide down a chute into his hands. The superfluous metal cut out by the dies drops into a pit underneath the machine and is cleared out periodically for melting down and further use. The machine turns out 350,000 back plates a year, and this is only one of the many jobs of the lighter kind that it undertakes.

Apart from the numerical output of the forging and stamping appliances used at Swindon, the work they do is notable for its range of variety. The machines described in this article, together with the hydraulic presses, which are mainly concerned with the bending and shaping of plate metal, necessitate the keeping of a stock of over 1,400 dies of different kinds.

A Northern Railway Centenary

An interesting centenary that occurred recently was that of the public opening of the first section of the Manchester and Leeds Railway, an event that marked an important stage in railway development in the North of England. The line later became part of the Lancashire and Yorkshire Railway, and is now a busy section of the Central Division of the L.M.S. system.

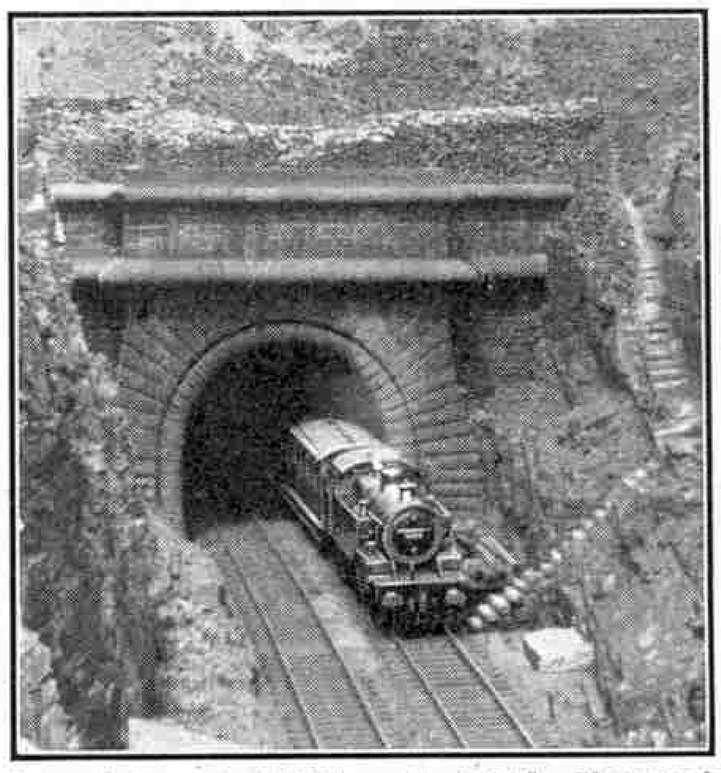
There had been proposals for a railway between Manchester and Leeds as early as 1825, but the scheme was poorly supported, and when the Manchester and Leeds Company was formed later opposition on the part of canal interests proved so strong that the Act of Parliament authorising the construction of the line was not obtained until 1836. The route was surveyed and the line constructed by George Stephenson. The first section opened to the public was the 14-mile stretch between Manchester and Littleborough, which was opened on 4th July 1839. The service then consisted of only eight trains a day in each direction.

The boring of Summit Tunnel, between Littleborough and Walsden, was regarded at the time by Stephenson as the greatest feat of railway engineering he had then achieved. It pierces the hard millstone grit and limestone of the Pennines, and is 2,885 yds. long, the eighth longest on the L.M.S. system. Four years were spent in boring it and 1,000 men employed on the task used 23 million bricks and 8,000 tons of cement in its construction.

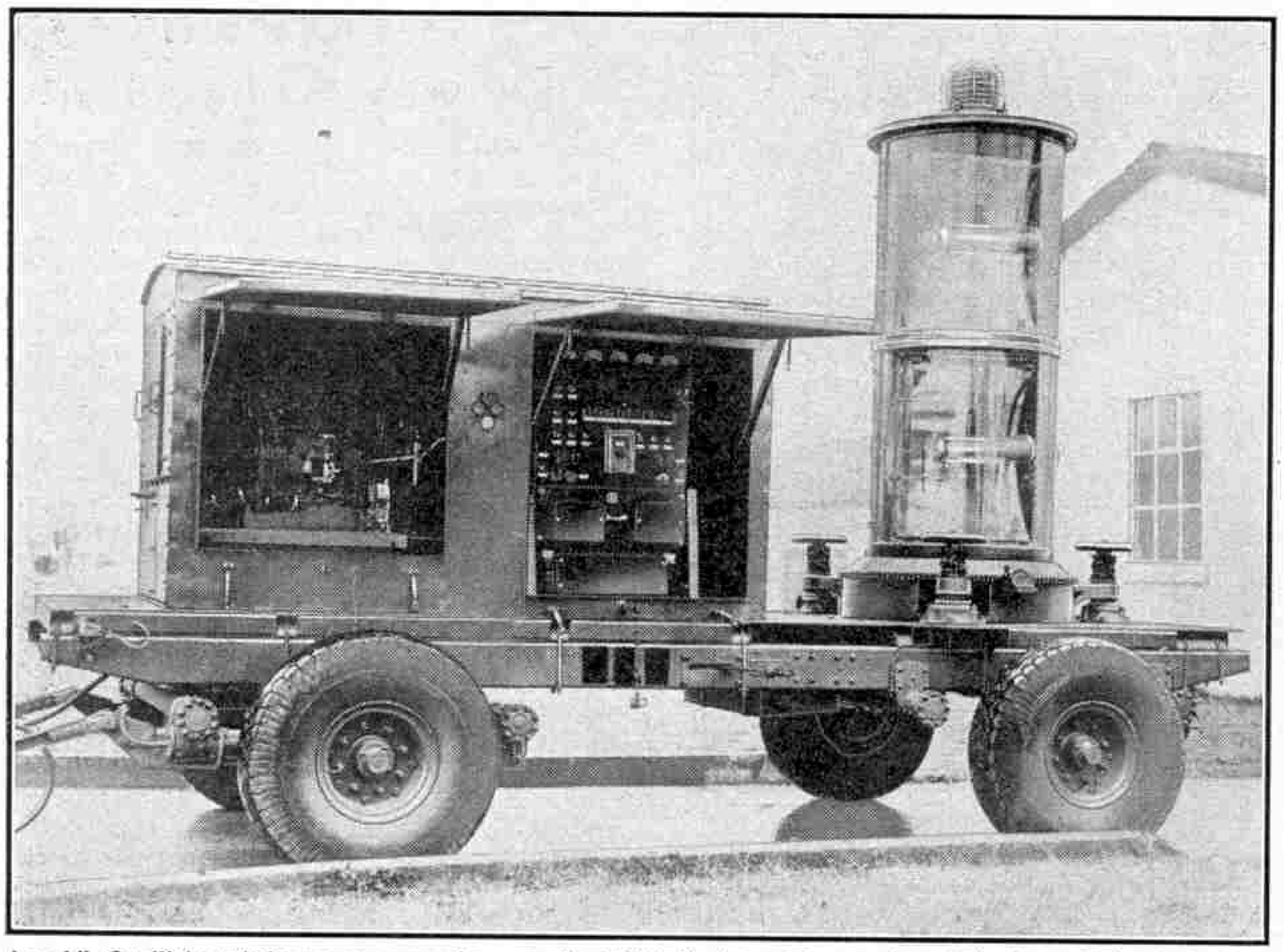
Other engineering features of the line were 22 viaducts, 134 other bridges and 10 tunnels in addition to that at Summit. One curious point is that at first the gauge was the unusual one of 4 ft. 9 in.

The original Manchester terminus of the Manchester and Leeds Railway was at Oldham Road. This is now an important L.M.S. goods station dealing with about 2,000,000 consignments a year. Traces of the original buildings are still to be seen. Passenger trains were transferred in 1844 to Hunt's Bank, which later became Victoria Station.

More than 1,800 passengers were carried daily during the first six months for which the initial portion of the Manchester and Leeds Railway was opened for traffic. Now some 13,000 people arrive at Victoria in more than 40 trains during the morning "rush hour," from 8 a.m. to 9 a.m.



Summit Tunnel, Littleborough, L.M.S. Photograph by J. M. Tomlinson, Poulton-le-Fylde.



A mobile floodlight unit for use as an aerodrome landing light. Photograph by courtesy of The General Electric Co. Ltd.

Engineering News

Mobile Floodlight for Aerodromes

The upper illustration on this page shows a self-contained 4 kW mobile floodlight designed for use as a landing light at aerodromes. It was manufactured by the General Electric Co. Ltd., and consists of an alternator driven by a petrol engine which, together with auxiliary equipment and switchgear, are mounted on a trailer for easy transport.

The floodlight consists of two parabolic silvered-glass trough reflectors, which are mounted one above the other. Each reflector is provided with one 2,000-watt Osram horizon type lamp, having a line filament set at the line focus of the reflector. The position of the lamps in relation to their mirrors can be accurately adjusted by means of focussing screws. The floodlight housing is constructed of sheet copper, and is mounted on a rotating base made from cast iron. For other parts of the structure non-ferrous metals are used. Half-cylindrical glazed doors, which slide around the back of the floodlight to allow the lamps to be cleaned or replaced, make the complete unit entirely weatherproof, and they are protected by detachable aluminium shields from stones or debris thrown up by the wheels during transport. The unit is surmounted by a two-lamp obstruction light, which is fed with current from low voltage equipment on the trailer.

Coloured Stainless Steel

A new process by which stainless steel can be produced in various colours has been invented in America. The steel is first coated with certain chemicals and then heated, when it turns any selected colour.

Cutting Ice by Water Jet

Successful tests have been carried out at Leningrad, U.S.S.R., on the cutting of ice by a powerful jet of water under a pressure of 750-900 lb. per sq. in. The device was invented a few years ago by a Soviet engineer named Chizhikov. During the tests a jet of water about $\frac{3}{4}$ in. diameter cut through a 39 in. cube of ice in 15 minutes. An installation known as a hydro-icecutter, which operates on this principle, has now been installed on board the icebreaker "Yermak" and will be employed experimentally on the Arctic sea routes during the navigation season.

Mont Blanc Cable Railway

Work is now in progress on the construction of a cable railway that will ascend the southern peak of Mont Blanc. It will be equipped with two aerial cabins each capable of carrying 15 passengers and a conductor, and these will travel one in each direction. The upper terminal station of the line will be at an altitude of 11,963 ft.

Condenser with 50 miles of Tubes

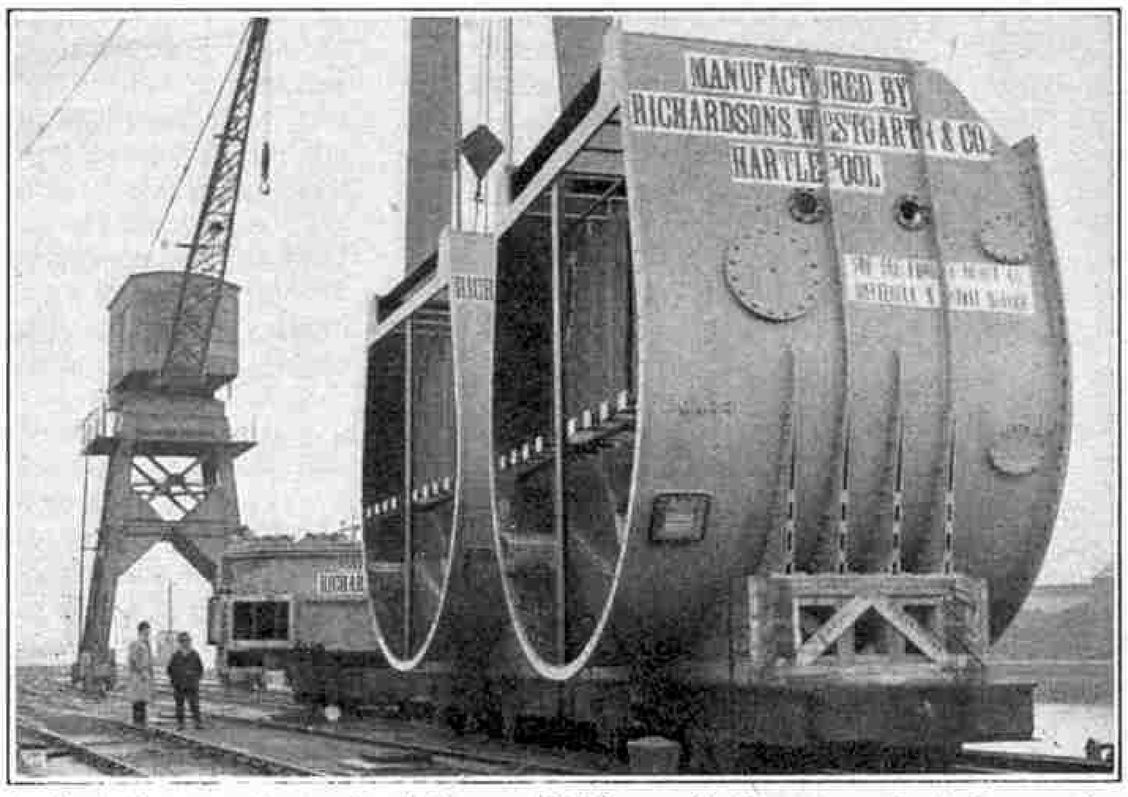
In modern electric power stations the generators are driven by steam turbines. From the turbines the steam passes into a condenser that performs two important duties. It turns into water the steam that has done its work in the turbine, so that it can be used again to feed the boilers, and in conjunction with an air ejector it maintains a high vacuum on the exhaust side of the turbine, thus ensuring a steady flow of steam.

There are many types of condensers, but those used for turbines are nearly always of the surface type. In these the exhaust steam is condensed by coming into contact with a cold surface, in the same way that steam from a kettle can be condensed by discharging it on to a cold plate. The cold surface is provided by brass tubes through which cold water is pumped.

The lower illustration on this page shows the halves of the shell of a giant condenser built recently by Richardsons, Westgarth and Co. Ltd., Hartlepool, for the Battersea "B" Power Station, London. The condenser is shown in halves on the quayside at Hartlepool ready for shipment to London. At the power station they were bolted together and over 50 miles of tubing through which to pump the cooling water were inserted. The exhaust steam enters the condenser through an orifice in the top that is large enough to pass a modern double-decker bus! The shell is built up from mild steel plates electrically welded together.

A Novel French Bus

Remarkable claims are made for a light-weight chassisless bus that has been introduced in France. The vehicle is a 30-seater of the single-decker type, and is of welded construction throughout. The frame members are steel tubes, and owing to the special construction adopted the weight of the complete bus is said to be 3 tons less than that of a similar vehicle of normal design. It is driven by an eight-cylinder engine mounted at the rear, the drive being transmitted through a four-speed gearbox and a short shaft. The engine, clutch, and gearbox form a unit that can be withdrawn on slides after disconnecting the controls and the propeller shaft, an arrangement that greatly facilitates maintenance and repair work.



A giant steam condenser for Battersea "B" Power Station, shown in halves on the quayside at Hartlepool ready for shipment to London. Photograph by courtesy of Richardsons, Westgarth and Co. Ltd., Hartlepool.

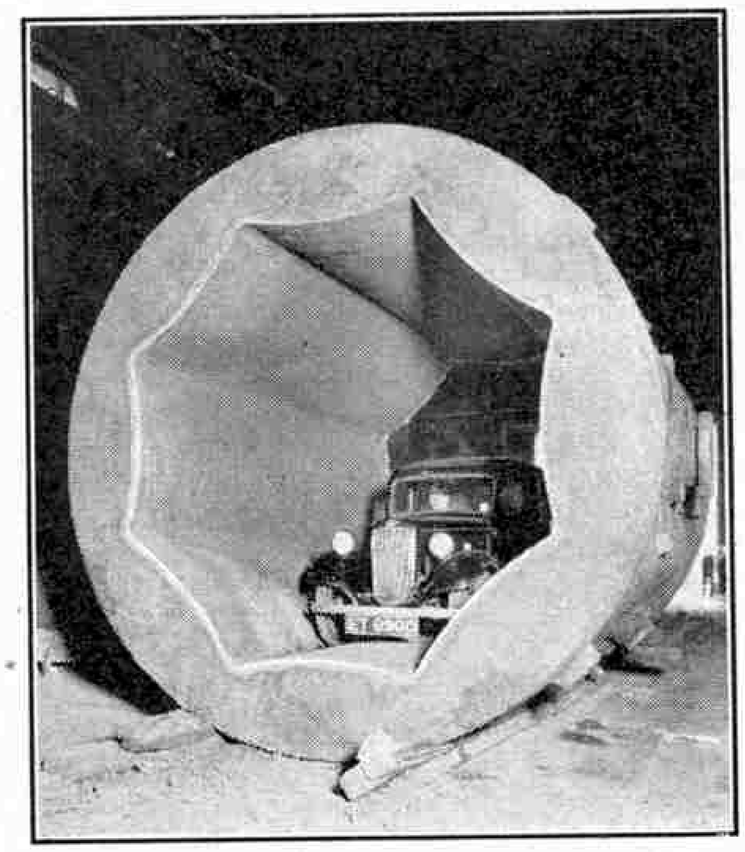
World's Heaviest Ingot Mould

The synthetic production of chemicals and the hydrogenation of coal to produce petrol and oil, which are now rapidly growing industries, have necessitated the manufacture of hollow forged high-pressure vessels from steel ingots of a size hitherto unheard of. The electric grid distribution scheme that has been developed in this country has created a demand for enormous forged boiler drums and steam receivers, and the construction of the huge liners, warships, and aircraft carriers that are now being built also calls for very heavy forgings.

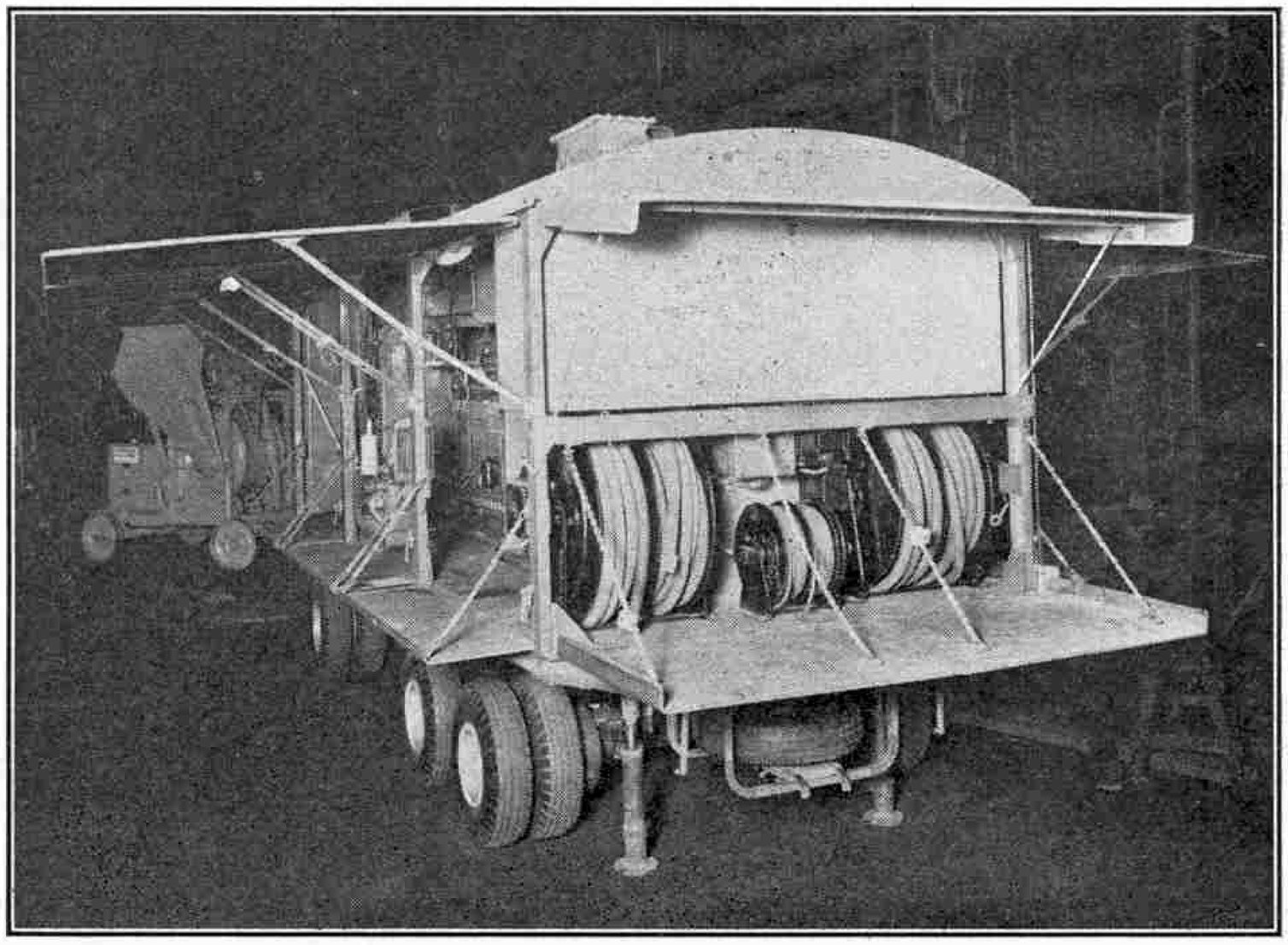
The English Steel Corporation Ltd., Sheffield, have many important orders on hand in this class of work and are regularly producing steel ingots of record size in both carbon and alloy steels. In the "*Engineering News*" pages of the "*M.M.*" for January 1938 we illustrated a huge ingot weighing 230 tons that was produced by this firm. Recently the world's heaviest one-piece cast iron ingot mould was delivered to their Vickers Works, Sheffield. This is shown in the lower illustration on this page, and its production is an outstanding achievement in iron foundry work. Seven great ladles were used to pour the 170 tons of molten metal required for its manufacture, and the operation was completed in only $8\frac{3}{4}$ minutes. The work was carried out by the Brightside Foundry and Engineering Co. Ltd., and its completion is a tribute to the way in which they tackled the task of producing a mould of such exceptional size.

Damage to New Belgian Canal

A serious accident has occurred to the newly-completed Albert Canal, Belgium, which was referred to in the "*Engineering News*" pages of the "*M.M.*" for April last. The Canal was to have been opened officially this month by H.M. King Leopold, but cracks appeared recently in the embankment near one of the locks, and although steps were immediately taken to repair the damage a portion of the embankment collapsed, leaving a gap nearly 600 yds. wide. The released water rapidly flooded a large area, and much of it ran into a small river that in turn overflowed its banks, with consequent damage to adjacent properties. It is expected that it will be some months before repairs can be made.



The world's heaviest ingot mould, made by the Brightside Foundry and Engineering Co. Ltd. for the English Steel Corporation Ltd., to whom we are indebted for our photograph. The mould is described on this page.



One of the mobile Diesel generating sets owned by the Metropolitan Water Board, which are described on this page. Photograph by courtesy of John Fowler and Co. (Leeds) Ltd.

Safeguarding London's Water Supply in Air Raids

As part of its scheme to safeguard London's water supply in the event of air raids, the Metropolitan Water Board has ordered ten 150 kW Diesel generator sets from John Fowler and Co. (Leeds) Ltd. These sets would supply current to operate either transportable motor-driven pumps or stationary installations during failure of the main supply. One of them is illustrated on this page.

Each of the generator sets comprises a specially designed six-wheeled enclosed trailer, 19 ft. long, 8 ft. 6 in. wide and 12 ft. high, on which are mounted the engine and generator and the necessary auxiliary equipment such as oil filter, switch-board and cable drum.

The engine is a six-cylinder 225 b.h.p. Fowler-Sanders unit, suitable for running for long periods without frequent skilled attention. The cylinder heads are made of nickel cast iron and incorporate Fowler-Sanders "two-way-swirl" combustion chambers as well as the inlet and exhaust valves. C.A.V.-Bosch pumps and injectors are fitted, and cooling is by a radiator and fan assisted by a centrifugal water pump driven off the engine.

The tank holds sufficient fuel for 10 hours full-load running and is mounted under the trailer roof. It can be filled from barrels at ground level by means of a semi-rotary pump.

Directly coupled to the engine through a flexible coupling unit is a Crompton-Parkinson 150 kW 220V direct current generator, and above this is mounted a temperature gauge panel and a tachometer. An auxiliary battery charging set of 800 W. capacity is provided. This consists of a Fowler petrol engine directly coupled to a Crompton-Parkinson generator. The switch-board is placed at the rear of the trailer, where there are also two large cable drums, each carrying two 60-ft. lengths of single-core electric cable. In between these is a smaller drum carrying a 60 ft. length of cable for supplying current to fire brigade search-flood lights.

Among the other accessories is a "Stream-Line" oil filter warmed by water from an exhaust gas heater acting as a silencer and mounted on the roof.

Novel Lamp to Aid Motorists in Wartime "Black-outs"

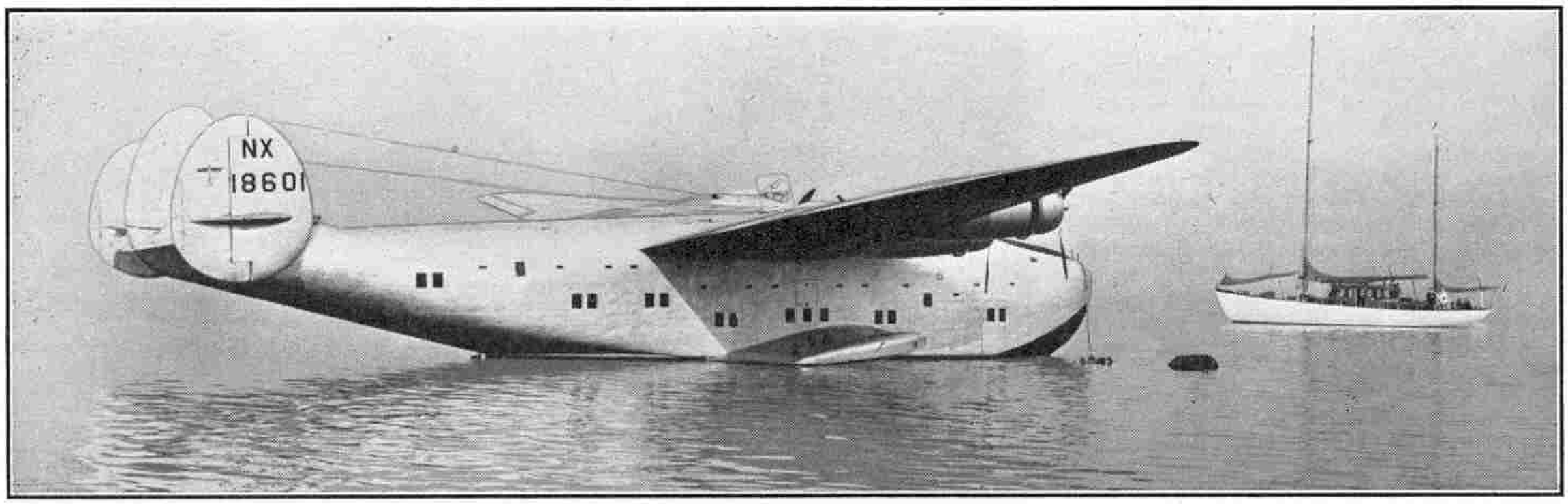
Mr. J. Evans, a Liverpool radio engineer, and Mr. A. V. Rhead, an Oxford research chemist, have invented an ingenious device that may be of great help to motorists during complete "black-outs" in war time. It comprises an ultra-violet lamp, which can be fitted to any motor vehicle and operated direct from the car's 6- or 12-volt battery. The lamp is all but invisible from a distance of a few yards, but it will illumine a line on the road or the edge of a kerb that has previously been treated with a special chemical paint. The paint itself is not luminous until the invisible rays of the lamp have been directed upon it. Thousands of miles of roads are already provided with white lines or kerbs. If these lines were treated with the special paint the roads would be prepared for any black-out. Nothing at all could be seen from above.

The system also would provide useful guidance for the drivers of vehicles travelling in convoy at night. For this purpose a splash of the paint could be placed on the tail of each vehicle so that the ultra-violet lamp of the one behind could be directed upon it.

An American Television Aerial

One of the most up-to-date aerial systems in the world has been erected recently on top of the Empire State Building, New York. The aerial towers 1,200 ft. above street level, and is used for radiating television programmes. It comprises four torpedo-shaped radiators supported by masts, which distribute the vision waves in four directions, and above these there are loop aerials that transmit the waves for speech and music.

The whole installation is strongly built to withstand vigorous weather conditions, and is fitted with special heating apparatus.



The first of the Boeing 314 "Clipper" flying boats.

America's Largest Flying Boats

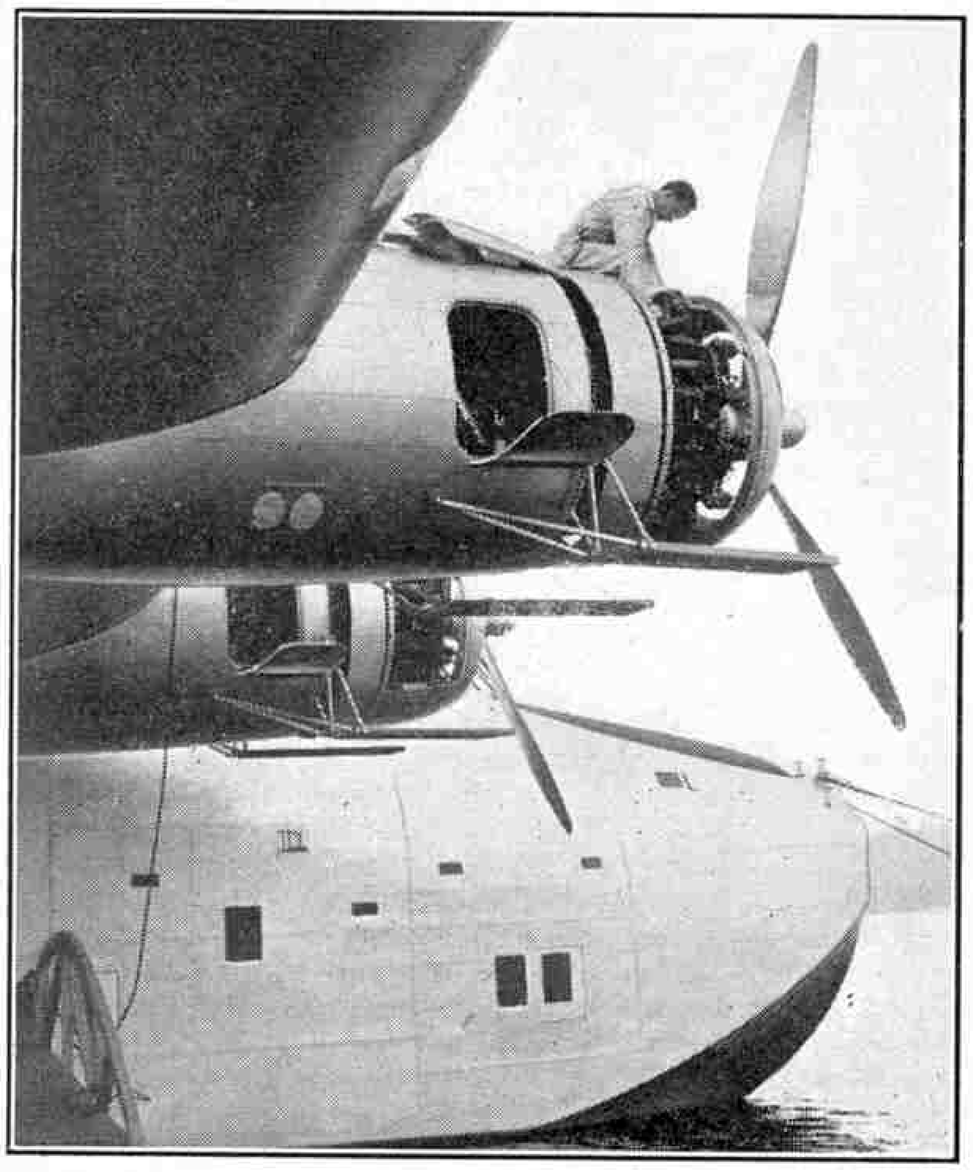
Giant Boeing "Clippers" for Pan American Airways

SIX long-range "Clipper" flying boats built for Pan American Airways by the Boeing Aircraft Company, of Seattle, Washington, are the largest aircraft of their kind ever produced in the United States. They are about double the size of Imperial Airways' Empire flying boats, with a wing span of 152 ft. and a length of 106 ft., and are larger and more powerfully equipped than the new British "G" class flying boats under construction for transatlantic service. When fully loaded these Boeing air liners weigh nearly 37 tons, and attain a top speed of 190 m.p.h.

The fine illustration at the head of this page shows the first of the "Clippers" and gives a good idea of their massive proportions. The 18 rooms in the hull are arranged on two decks connected by a spiral staircase. A total of 74 passengers can be carried by day and 40 by night, in addition to a crew of eight or more. For ocean service with 40 passengers on board the new flying boats have a range of 3,100 miles.

All of these "Clippers" have now been completed and delivered to Pan American Airways. One of them, named *"Atlantic Clipper,"* is in service on the Baltimore-Bermuda air route. Another, *"Yankee Clipper,"* last March carried out a transatlantic survey flight from Baltimore to Foynes and back by way of the Azores and Southampton, as reported in the *"Air News"* pages of the May 1939 *"M.M."* This flight was really more than an aerial survey, as it thoroughly tested the new flying boat under actual service conditions, and provided valuable experience for the crew in carrying out their duties. In May this flying boat inaugurated an air mail service between Baltimore and Marseilles by the Azores route. The *"Honolulu Clipper"* and the *"California Clipper"* have been in regular service on the Pacific Ocean routes of Pan American Airways for several months. Of the two remaining "Clippers" one has been named *"Dixie Clipper."*

Owing to their great size these "Clippers" were built by methods approaching shipbuilding technique. The hulls were assembled in the vast Boeing assembly building, each in a huge jig that resembles a shipbuilding cradle and is encircled by a mass of scaffolding and walkways to enable the work to be carried on at five different levels at the same time. In the shipyard-type "loft" the hull contour lines were laid down full size for the first "Clipper." Full-scale templates, drawings on white-coated aluminium sheets, were taken from there and used to supplement the ordinary workshop blueprints in building the flying boats. The drilling operations preparatory to riveting the bulkhead parts of the hulls together were done by means of a huge travelling drill moving on widely spaced tracks straddling the assembly jigs for the bulkheads.



At work on one of the 1,500 h.p. engines. Photographs by courtesy of Boeing Aircraft Company, U.S.A.

There are about 50,000 different parts in each "Clipper," and these are assembled with 15,200 bolts and about 1,000,000 rivets. Extensive use was made of electric spot welding for effective joints in non-highly stressed places. For instance, the Alclad aluminium alloy sheets for the wing skin were seamed together by this process before being riveted to the wing structure. The main wing and the two short stub wings or sponsons, one on each side of the hull to give the aircraft stability while taxi-ing on the water, were assembled separate from the hull.

When the hull was ready it was placed on a specially built "beaching gear," a 15-ton 8-wheeled cradle of structural steel with a series of air tanks that give it buoyancy in the water. Winches and cables were used to move the massive hull on to a ramp in the dock outside the assembly building. During the ensuing weeks the main and stub wings were fitted, the four powerful engines mounted in place, and the extensive internal equipment installed. At last the flying boat was completed, and it was then "launched" into the adjoining Duwamish Waterway, and towed downstream to the open water of Elliott Bay for preliminary surface manœuvres and tests. Later it was flown to the Boeing test base on the shore of Lake Washington.

The first Boeing 314 flying boat *"Honolulu Clipper,"* was completed last summer, and as it was the first of a new type it was subjected to a long series of tests described by the company as the most rigorous and thorough ever planned for a new transport aircraft. The tests were carried out in three

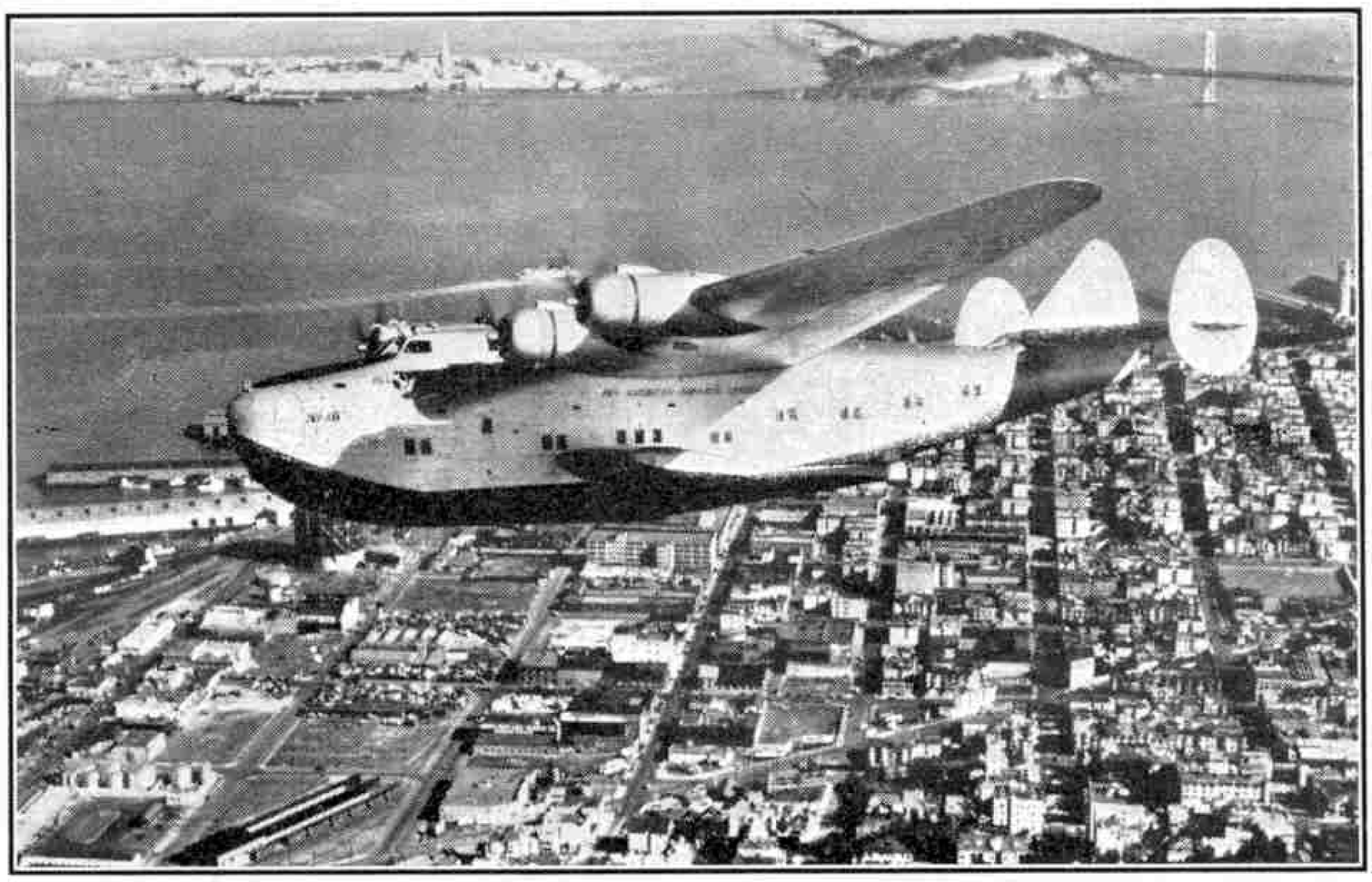
stages, the preliminary, manufacturer's, and official trials. The preliminary tests were concerned chiefly with the water-handling qualities of the flying boat, and included 250 miles of surface taxi-ing, several take-off runs, flying, and countless stationary tests. The data obtained indicated how the aircraft could be further improved, and resulted in the single tail unit being replaced by a wide twin-rudder one, to provide maximum rudder control for manœuvring the flying boat on the water. Alterations also were made to the angle and span of the stub wings, to enable them to give greater lateral stability to the aircraft during manœuvres on the water.

In the second phase of the tests, the "*Honolulu Clipper*" was put through all types of manœuvres in conditions much more severe than are encountered in normal transoceanic service. In addition to trials with the new twin rudder in position, tests were also made with a central stationary fin added, and this fin is now a standard part of the tail unit of the "Clippers."

Later the flying boat was put through her paces again during the official Civil Aeronautics Authority tests. They were carried out in the presence of government representatives, and were fully satisfactory.

The massive hull of the Boeing 314 "Clipper" is 19 ft. high and has two full decks, as mentioned earlier. On the upper one are the control room, mail and freight compartments, and the crew's quarters, and the lower one is occupied by the passenger accommodation. The control room is remarkable for its size, and, in fact, is the largest room in the aircraft. It is 21 ft. 4 in. long and 9 ft. 6 in. wide, and is sound-proofed throughout so that the six members of the crew can converse in ordinary tones. Interphones are also provided. The first and second pilots' stations are at the forward end, and their surprisingly small number of controls and instruments is due to many of the duties performed by pilots on smaller aircraft being allotted to other members of the crew in this big flying boat. There is a gyropilot between the two groups of instruments.

Between the seats for the pilots is a door beyond which steps lead down to a bow compartment on the lower deck, that contains mooring apparatus and the "Clipper's" 80-lb. stainless steel anchor. Behind the second pilot's seat is a spiral staircase to the passenger deck below, and a little further aft is the radio operator's station. He maintains contact with the ground stations and supplies radio bearings to the navigator, and his equipment includes three transmitters and four receivers. Overhead is the control dial of the radio direction finder. The flight engineer sits behind the radio operator. He is responsible for the proper functioning of the power plants, including the calculation of power and fuel required to fly the aircraft under the conditions set by the navigator and the pilot.



"Atlantic Clipper," the second of the six new Boeing flying boats for Pan American Airways, in flight.

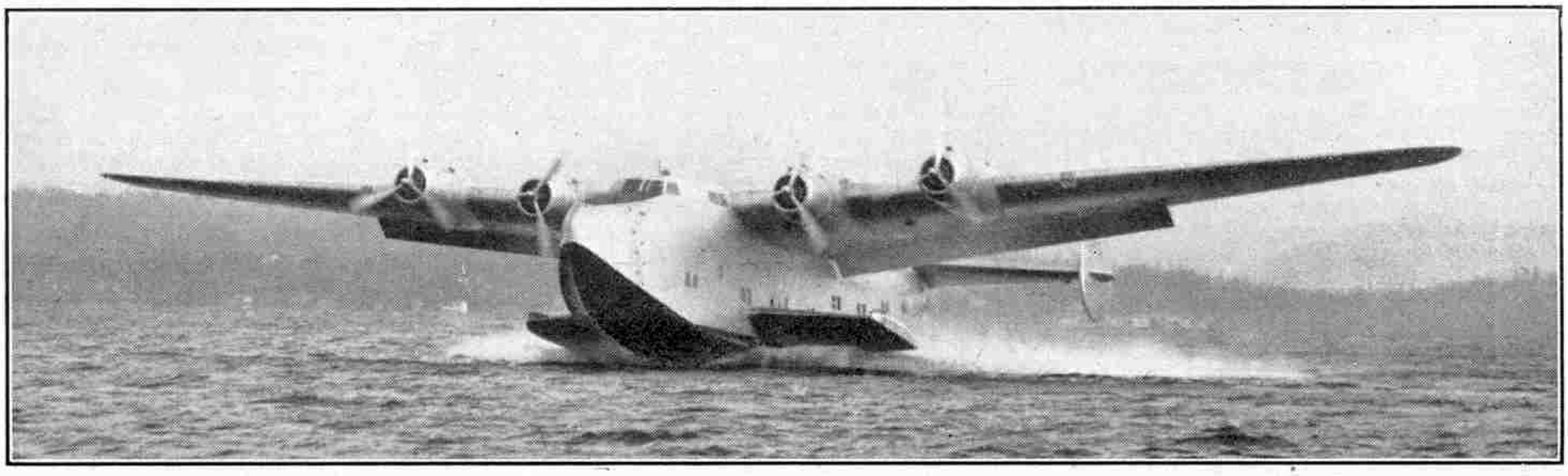
The navigator's position is on the port side of the control room, and has a broad 7 ft. long table on which full-size nautical charts can be laid out. In addition there is an observatory in the wing centre section and behind the control room, where he can make celestial observations through a streamlined overhead turret. He also has two drift sight stations on the underside of each wing, for taking drift measurements. Just behind the navigator's station is the captain's desk and chair, with a second chair alongside to facilitate conferences with the navigator or other officers. The captain supervises the work of other members of the crew, and co-ordinates flight procedure. This separate appointment is an innovation, as in previous large aircraft the first pilot has also been the captain.

Near the back of the control room is a door in each side wall, leading to the port and starboard engines respectively. The doors give access to narrow passages called "catwalks" that pass within the leading edges of the wings to the four engine nacelles. Each nacelle contains a 1,500 h.p. Wright "Cyclone" engine, and is large enough for mechanics to work erect in it. The 14 ft. diameter full-feathering airscrews enable any of the engines to be stopped completely during flight, so that mechanics may work on engine accessories while the aircraft is in the air. Outer doors on either side of each nacelle open to form platforms from which the mechanics may reach the outside of the engines when the flying boat is on the water.

The cargo section is behind the control room, in the centre of the giant wing, and is divided into separate compartments for mail, baggage, and express freight. Above the aisle in this section is a large cargo loading hatch that incorporates the glass-enclosed turret used by the navigator for celestial observations. At each end of the group of cargo compartments is a 600 gall. fuel tank. The main fuel tanks, each of 1,500 galls. capacity, are in the stub wings. Behind the cargo section are the crew's sleeping quarters, and there is additional sleeping accommodation for crew members in the bow portion of the lower deck.

Since this article was written two of these flying boats, "*Yankee Clipper*" and "*Dixie Clipper*" have taken part in the regular transatlantic air service introduced in June last. The aircraft are operating over the northern route to Southampton by way of Newfoundland, and the southern route to Marseilles via the Azores.

The first "Clipper" alighting on Lake Washington after a test flight.



"Down on the Farm"

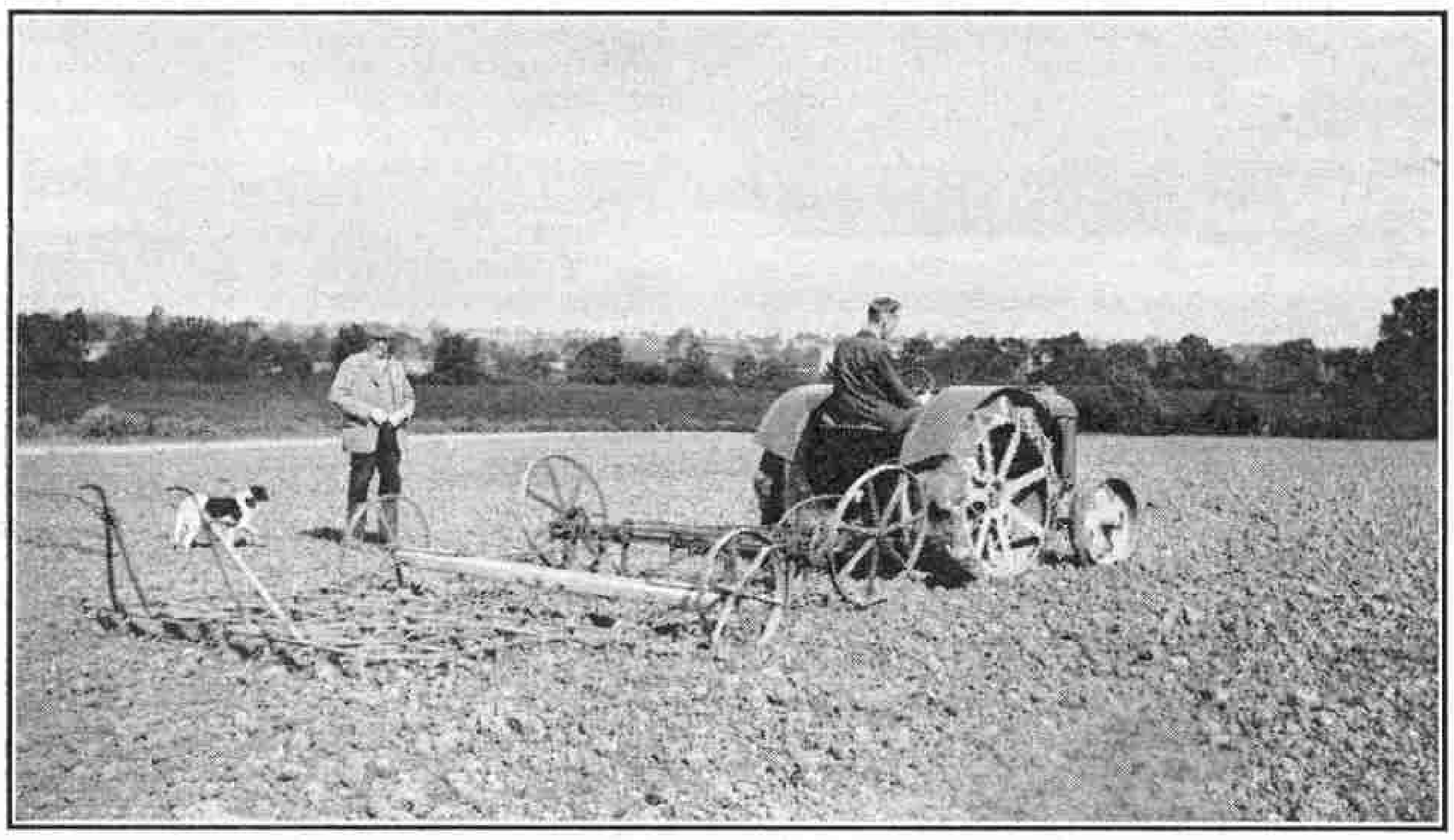
By Rev. P. A. Wright



One of the first combine-harvesters to reach Great Britain. It cuts and threshes corn in one operation.

THE Farmer's Boy of to-day still does the same work, still goes to "plow and sow, to reap and mow," but he tackles the jobs in different ways and with different tools from those of his forefathers. Man has increased his knowledge and accordingly has adapted the various methods by which he co-operates with nature. Our fathers and grandfathers lived through the era of the chemist; ours is decidedly the era of the engineer. Indeed it is true to say that agriculture is being revolutionized by vast schemes that are tending to make Jack and his master rather like the cogs of a great machine.

In spite of this, however, we still come across survivals of a picturesque and immemorial past. Overgrown with nettles in odd corners of field and yard, or among rubbish in disused sheds, we can find implements, crude in design, which have been discarded. These are not familiar to a generation that has grown up attuned to the hum of machines.



A tractor hauling a set of harrows and a slicer. Normally six horses would be needed for this work.

With agriculture in a serious plight the changes have been swift, and the farmer has had to scheme things so that his expenses are as low as possible. In most cases he has found that the use of machinery wherever possible in place of man power is much cheaper in the long run. Take for instance the time-honoured work of the ploughman. He still follows his pair of horses down the furrow, "turning a stubborn clay to fruit," and he will remain with us; yet more and more of this work is now being done, and done well on even quite small farms, by tractors. Those of the creeper track type will plough some six furrows or so at a time, so that one can easily imagine the saving in time and expense. Still more revolutionary has been the advent of the massive gyro-tiller, which carves its way deep down into the subsoil, thereby giving the stiffest of clays a terrific pulverizing and upheaval. Electric lamps have enabled these vast machines to work on throughout the night, much to the annoyance of country-folk trying to secure their hard-earned rest. They work on crude oil, and are an advance on the big sets of steam cable tackle that for long have been familiar objects in the country. These not only do ploughing, but cultivating and mole-draining as well, all by the cable system with a stationary engine at each end of the field.

The other tilling operations, harrowing, slicing and rolling, are now all done by tractor power on large farms. Recently I helped to fit up an old slicer or thistle-cutter, to be towed along with a set of heavy harrows. The whole outfit is drawn by a small tractor, and does work that could not be accomplished otherwise by fewer than two men and six horses. The delicate task of drilling seed is actually being done by tractor power on some farms to-day. What a change from the time when the sower quite literally "went forth to sow," scattering his seed broadcast or dropping it individually into holes made by an iron dibber! The tin that the sower used was called a "seed-lip," and is still employed for sowing artificial manures in small quantities, although even for this job a mechanical distributor is available.

Haymaking, or to be correct "Haysel," used to be a long drawn out ritual, with scythes sweeping through the grass and bull-daisies hour by hour. Now a mechanical mower does the job neatly and quickly. Even the horse-drawn mower is being superseded by a small knife attachment on an ordinary farm tractor. Hand forks and rakes turned and "made" the hay, and still do to a certain degree. Yet hay-tedders and swathe-turners have been in use a long time, and have long been featured in the range of Meccano models. On some big farms even the haycart is doomed. Instead we find the hay being pushed to the stack by a sweep attached to the front of a tractor, or even to an ordinary car. Work of this kind has in fact become the fate of quite a few old high-power cars whose engines are still sound. It must be pointed out, however, that hay swept up in this manner may easily contain sticks and stones.

Harvest-tide produces evidence of yet more change. In past days the labourers were awakened at daybreak by the sounding of the harvest horn, and soon would begin their arduous job of hand reaping with either sickle or scythe. The leader of the gang bore the fine old title "Lord of the Harvest," and always worked a bit ahead. The wives and children of the men followed the reapers and tied the corn into sheaves. There were many quaint customs in those days. For instance, a boy beginning his first harvest was called a "Colt" and had to be "Shod." This meant that he was held down while the "Lord" drove a nail into his boot; and he was released only on condition that he contributed to the ration of beer, which was often home-brewed and was carried into the fields in small wooden kegs. After the corn was carted, the gleaners' bell summoned the women to go and pick up what was left.

The scythe was gradually superseded by a crude mower, and then by a "sail-reaper," and these are useful to-day when the corn is laid low by storms. The advent of the self-binder was important, for it bound the corn into sheaves as well as cutting it. One of these machines behind a tractor can reap a big acreage in a short time.

Most readers at some time or another will have seen a self-binder at work, and will recall how the standing corn is swept towards the cutting knife by the rotating sails. The knife, which is protected by fixed points, consists of a series of triangular blades mounted on a shaft that moves back and forth at high speed. The cut corn falls

on to a platform canvas, from which it is carried by other moving canvases on rollers up to where steel packers make up the sheaf tightly. When the sheaf reaches the required weight, a clever mechanism binds it with twine, and releases it.

The man or boy who rides on the seat of the binder is able by the judicious use of levers to alter the position of the cutting platform, and the sails, and to vary the size and shape of the sheaves to suit the conditions. He also looks out for blocked canvases, occasional unthreading of the string, a slipping chain or a broken cog-wheel. So perfect are the binders of to-day, however, that his job is often quite easy. The advent of these binders aroused terrific opposition from the rural populace, who organised gangs that went about and in some cases actually broke up the machines, so strongly did they resent the intrusion of something that ultimately was to relieve them of much hard work.



An ordinary farm wagon fitted with a drawbar instead of shafts so that it can be hauled by a tractor.

The cutting principle of the combine-harvester is similar to that of a binder, but it takes a much wider stretch at once. The cut corn is not tied into sheaves. Instead it is conveyed to a drum driven by a paraffin engine, which threshes it and delivers the seed into sacks that are dropped at intervals, as also are heaps of newly-threshed straw. I photographed what was, I believe, the first of these machines to reach Suffolk. The photograph was taken on its trial run and is reproduced in the illustration at the head of this article.

The vast sun-baked stretches of the hedgeless prairies of Canada lend themselves more readily to the successful working of a machine of this kind than English fields, which are smaller and shaded, and in a climate that is very fickle. Corn needs to be absolutely dry for successful threshing, otherwise it ferments and becomes unsaleable. During a wet harvest this is a problem and such times render it necessary to cut and stack the corn in the ordinary manner. It is true that the owner of a combine can also instal a kiln at the farm for drying newly-threshed corn, but this is a big expense, and not always satisfactory.

One great charm of English farming is the way we are able to adopt the new without altogether discarding the old. For instance we have seen how the plodding horse team may be at plough in the same field as the latest type of tractor. Again, although a six-cylinder car may push the hay to the stack at the rate of 10 m.p.h., yet the forks that deal with it on arrival are of the same type and shape as they always have been, and the combine-harvester may spend the winter in a barn, the beams of which were hand-hewn many centuries ago.

Threshing was originally done by a flail, a wooden implement in two sections. Using one of these was hard and skilful work, done in a big barn that had a specially hard and level floor. An old Suffolk saying shows how the workers were being paid. It is said that a slow thump, thump announced "Day work, day work, day work," while a brisker rhythm, "We took it, we took it" indicated piece work. Poor sort of humour this surely for the men concerned, as it was a tough job. Cuts made in the door posts of many an old barn indicated the sun-dial method by which the man of those days told the time. The modern power-driven threshing machine is a familiar sight now, but between the age of the flail and its arrival there were threshing drums driven by horse power.

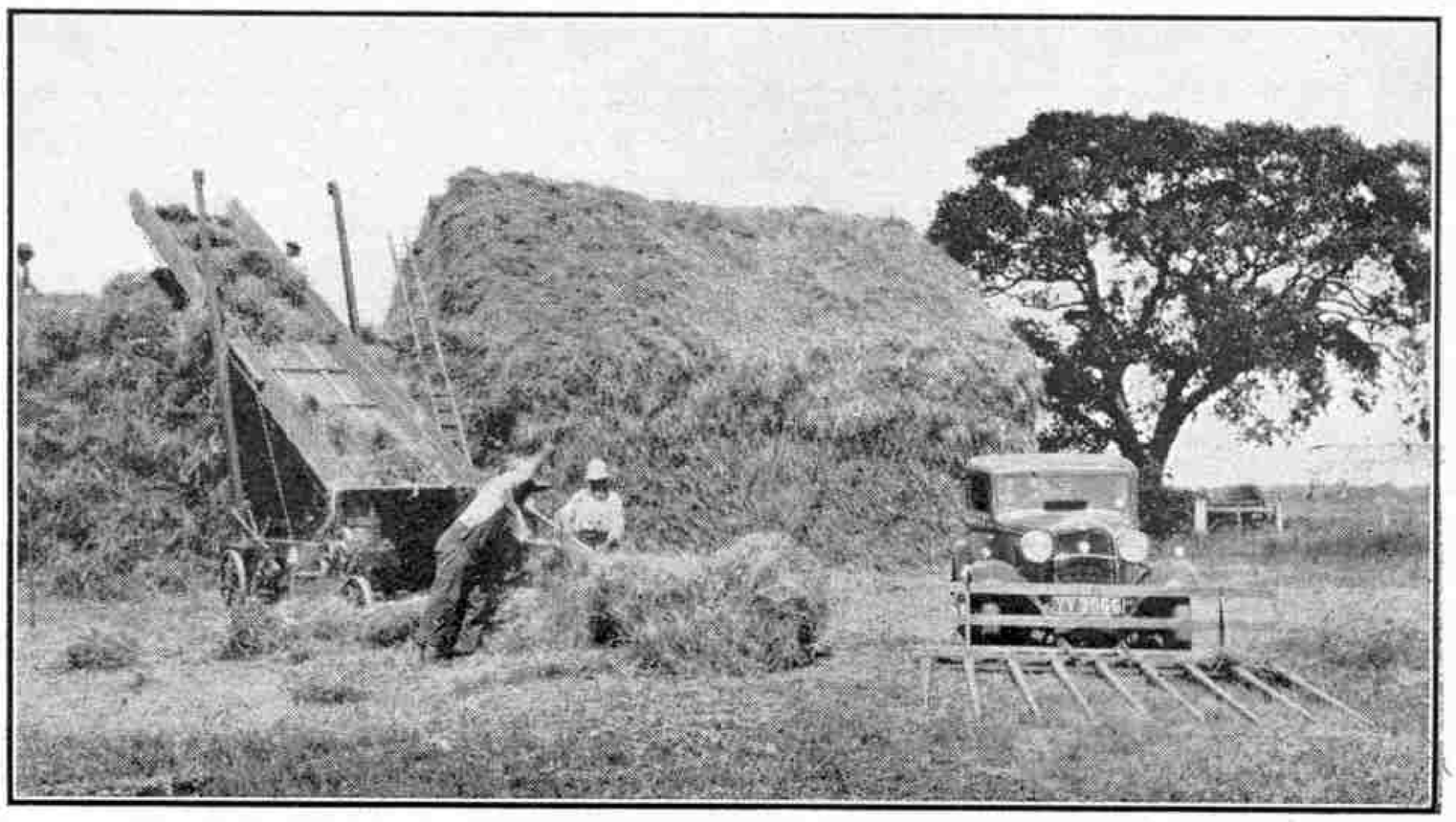
After harvest the barn was cleared and the Harvest Supper or "Horkey" took place, with roast beef and beer in profusion. Country dancing followed, and various folk would entertain.

Farm waggons have not undergone great change, and there are some in use that are over 100 years old. They vary in build and beauty, according to their locality, and are fine examples of local craftsmanship. Even these have sometimes been adapted by replacing shafts by an iron drawbar in order that they may be hauled by tractor. It seems too that the pneumatic tyres for farm carts have come to stay, although these are more useful on lighter soils than on heavy clay. The coming of sugar beet as a British crop has opened a new and immense field for the implement designer, but the handling of beet also is one of the most difficult of the hand jobs on a farm.

Machinery and motor traction have even invaded the garden. Gone are the days when a leather-booted horse drew a big lawn mower. His place is now taken by a neat motor mower, and large gardens are ploughed and harrowed by miniature motor cultivators. Not long ago I saw a very good specimen of one of these that a clever gardener had made himself. It had an iron frame with handles, and was adaptable for ploughing and various tillage operations. It was hauled by an ordinary motor cycle, from which he had removed the back wheel, replacing it by one shod with iron to give a better grip on the soil.

What of the farmer's wife and her poultry? Here again scientist and expert have been busy. Clucking broody hens have given place to mammoth incubators and brooders, which deal with chicks by the hundred. Even the occupants of the cow-shed have come under the spell of the machine, and are now registered units mechanically milked in spotless surroundings. They are attended by white-robed cowmen, who weigh out their rations and deliver them by overhead cable in a way suggestive of conveyors in a well-designed modern factory. Water-mills and wind-mills have practically ceased to do the necessary grinding for the farmer, who now has an oil engine, bedded down in the barn or granary, which probably drives not only a mill, but root and chaff cutters, or a cake-breaker.

It must be said in conclusion that the individuality and cleverness of the rural craftsman stand out in pleasing contrast to the cheap productivity of this present machine age. The skill of such men was often an inherited instinct, and should even now fire the imagination of any reader of the *"M.M."* who may be aspiring to be a farmer's boy. Change is fast blotting out these links with a past age, but it will be many years before all are finally severed.



Haymaking up to date. The hay is pushed to the stack by means of a sweep and there lifted on an elevator.

SHIPPING NEWS

Union-Castle Line's 14 New Ships

The handing-over to her owners, the Union-Castle Mail Steamship Co. Ltd., of the new passenger motorship *"Pretoria Castle,"* illustrated on this page, marks the completion of what is probably the largest construction programme ever undertaken by a shipping company. Since 1935 Harland and Wolff Ltd. have built 14 vessels for the Union-Castle line and this company now possess one of the most modern and best-equipped fleets in the world. In a little more than four years they have placed in service three large mail and passenger liners, four intermediate passenger liners, including the *"Pretoria Castle,"* six fast refrigerated fruit carriers, and a small coasting vessel. In addition five liners of their existing fleet have been reconstructed and re-engined, and three other vessels have been converted to oil-engine propulsion.

The new liner is a sister-ship to the *"Durban Castle,"* which was handed over in December last, and she was completed in April. Her overall length is about 595 ft., with a breadth of 76 ft., and she is of 17,392 tons gross. She has a well-raked rounded stem, a cruiser stern and a single low streamlined funnel, and the rounding of the superstructure forward contributes to her smart appearance. There are three complete steel decks, in addition to several decks running only part of the length of the vessel, including the forecastle, promenade and boat decks.

The *"Pretoria Castle"* has accommodation for 220 first class and 335 tourist class passengers. She has extensive refrigerated cargo space for the carriage of fruit, chilled beef and dairy produce. Twin-screws are fitted and driven by two Harland-Burmeister and Wain Diesel engines. It is interesting to note that in an emergency lifebuoys are released electrically from the bridge or locally.

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The four-masted barque *"Pamir,"* of 4,600 tons, was first home in this year's unofficial grain race from Australia, taking 96 days from Port Victoria to Falmouth.

The Union-Castle liner "Pretoria Castle," now in service between England and South Africa. Photograph by courtesy of Harland and Wolff Ltd., Belfast.

Life-Boat Gallantry

This year June was a busier month in the life-boat service than any corresponding month since 1916. Life-boats were called out 29 times and rescued 54 lives. Altogether life-boats have been launched 179 times during the first six months of this year, and have saved or helped no fewer than 146 vessels and boats. The number of lives rescued is 179.

The Royal National Life-boat Institution has awarded its bronze medal to Coxswain J. Wheatley, of Blyth, for the rescue of three of the crew of the steamer *"Skarv,"* of Sunderland, when that vessel was driven ashore in Cambois Bay. A strong wind was blowing, with very rough seas, and the motor life-boats at Blyth and Newbiggin were both called out. The Newbiggin boat returned to her station and tried without success to get tugs to go out. In the meantime the Blyth life-boat stood by and managed to get off three of the six men aboard. Then the vessel crashed on top of the life-boat and split her rudder, but in spite of this the life-boat men continued their attempts to rescue the other three members of the crew. Eventually the Blyth boat returned to her station for repairs. The Newbiggin life-boat put out again at once, but by the time she arrived the steamer was right in the surf and was unapproachable. Eventually the three men left on board were rescued by rocket apparatus from the shore, and the Newbiggin boat returned to her station.

Largest Trawler Built in Belgium

A trawler recently built by Beliard Crighton and Co., of Ostend, for trawling in the North Sea is the largest vessel yet built in Belgium for fishery purposes. She has a length of 138 ft., and is fitted with a six-cylinder Sulzer Diesel engine of 700 h.p. that gives the relatively high speed of 12 knots. The latest equipment is installed, including wireless telegraphy, wireless telephony and directional wireless. A Diesel-electric set of 120 h.p. is provided for operating the trawl, and for other services aboard. The ship is also equipped with a refrigerating plant of large capacity.

Sir Kingsley Wood Inspects Motor Boats at Hythe

When visiting the factory of the British Power Boat Co. Ltd., at Hythe, Southampton recently, the Right-Hon. Sir Kingsley Wood, M.P., Secretary of State for Air, inspected a number of the Power boats under construction there for the Royal Air Force and other Services. He went on board one of the new 70-ft. motor torpedo boats described in the May *"M.M.,"* and there met Mr. Hubert Scott-Paine, designer of the boats, who took him for a run into the Solent. The speed on the outward half of this trip was 47 knots, and the return was made at 45 knots.

Sir Kingsley saw under construction some of the latest 64-ft. high-speed launches now being delivered to the R.A.F. for deep-sea rescue work and made a close inspection of one of the latest armoured target boats, which are 40-ft. long and when travelling at 30 m.p.h. leave a conspicuous wake that serves as a target for practice bombing. Other boats seen were 57-ft. target-towing launches used by Army Coastal Batteries for gunnery practice, and new Admiralty boats on the Official Secrets List. On leaving the Air Minister was presented with a scale model of the 1,100 h.p. Rolls-Royce-Power Merlin Marine Engine that had been made by apprentices of the company.

Faster Fire-Fighting Craft

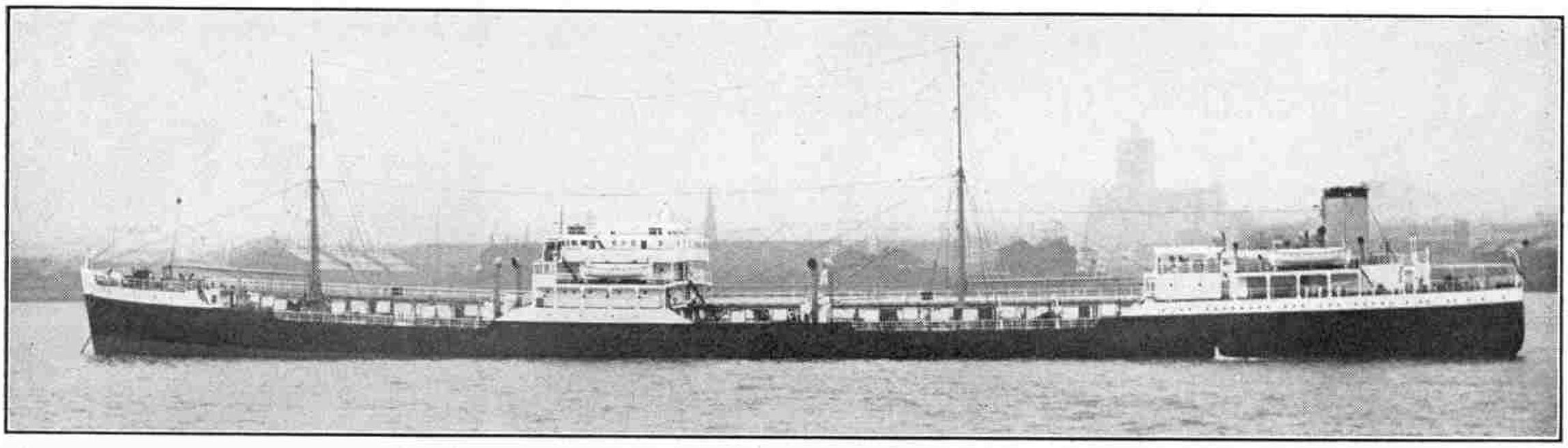
A fire-fighting craft of a new, fast type is to be built for the London Fire Brigade River Service by J. Samuel White and Co. Ltd., of Cowes, Isle of Wight. She will be 45 ft. long, and three 100-h.p. Power-Meadows internal-combustion engines will give her a speed of 20 knots. The engines will drive the fire pumps, each of the two wing units being coupled to a Dennis turbine pump, and the centre unit to an air-foam pump.

The new boat is in the nature of an experiment, as fire-fighting craft built in the past have been limited to a speed of about 12 knots by the amount of pumping equipment that had to be carried. Recent developments in high-speed boats have rendered practicable faster fire-fighting craft, however, and with the new boat it is hoped to save some of those seconds that are so vital in an emergency when equipment is being rushed to the scene of a fire.

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The keel plates of the 40,000-ton battleship *"Temeraire"* have been laid in the Birkenhead yard of Cammell Laird and Co. Ltd.





The oil tanker "Diloma" in the Mersey. Photograph by T. C. L. Hutchinson.

A Mersey-Built Oil Tanker

The illustration on this page shows the oil tanker *"Diloma,"* built at Birkenhead by Cammell Laird and Co. Ltd. to the order of the Anglo-Saxon Petroleum Co. Ltd., of London. She was launched in February of this year, and was handed over after her trials in May.

The *"Diloma"* is 460 ft. in length between perpendiculars, with a deadweight tonnage of 12,000, and is of the single deck type, with a straight raked stem, cruiser stern, and the short funnel aft that is characteristic of most motor tankers. The two masts fitted can be telescoped to allow the boat to pass under the bridges across the Manchester Ship Canal. The vessel has 16 transverse oil-tight bulkheads and two longitudinal bulkheads forming the oil tanks, and the forward hold is fitted for general cargo. A single-acting 8-cylinder Diesel engine is installed to propel the vessel.

"Shamrock V" now a Cruising Yacht

The famous racing yacht *"Shamrock V,"* the last of the late Sir Thomas Lipton's challengers for the America's Cup, has been converted into an auxiliary cruising yacht. *"Shamrock V"* was built at Gosport in 1930 by Camper and Nicholson Ltd., and the alterations have been carried out by the same firm. These have included the fitting of a new sail rig, and the removal of some 14 tons of lead from the keel. In addition the interior has been completely redesigned, spacious accommodation being provided, and an 80-h.p. Gleniffer Diesel engine has been installed. A crew of 10 will be carried.

In her new form *"Shamrock V"* behaved very satisfactorily during trials under power, and at a maximum speed of about 8 knots left scarcely any wake. She then sailed to the Mediterranean, where her new owner lives.

Novel Method of Salvage

During a typhoon in September 1937 at Hong Kong in which wind speeds reached 165 m.p.h., over 30 steamers and hundreds of junks were blown aground. Among the stranded vessels was the *"Conte Verde,"* one of the largest Italian merchant ships in service in the Far East. Although she was under full steam, and had all anchors in use, she was driven stern first on to treacherous rocks outside Hong Kong Harbour. The salvage of the vessel was undertaken by the Hong Kong and Whampoo Dock Co. Ltd., under the direction of Mr. E. Cocks, Manager of the company. Instead of lightening the ship, some 1,200 tons of salt water were poured into her bows, causing her to tilt in such a manner that at high tide she slid off into deep water.

New French Aircraft Carriers

The one-time French battleship *"Béarn,"* one of the first vessels to be converted into an aircraft carrier, is no longer fast enough for service, and the only modern ship of the kind in the French Navy is the *"Commandant-Teste."* There are two aircraft carriers under construction, however. These are the sister ships *"Joffre"* and *"Painlevé,"* which will be similar in design. Each will have a displacement of 18,000 tons, with a length of about 770 ft. and a speed of more than 30 knots, and will carry about 40 aircraft.

New Rumanian Floating Dock

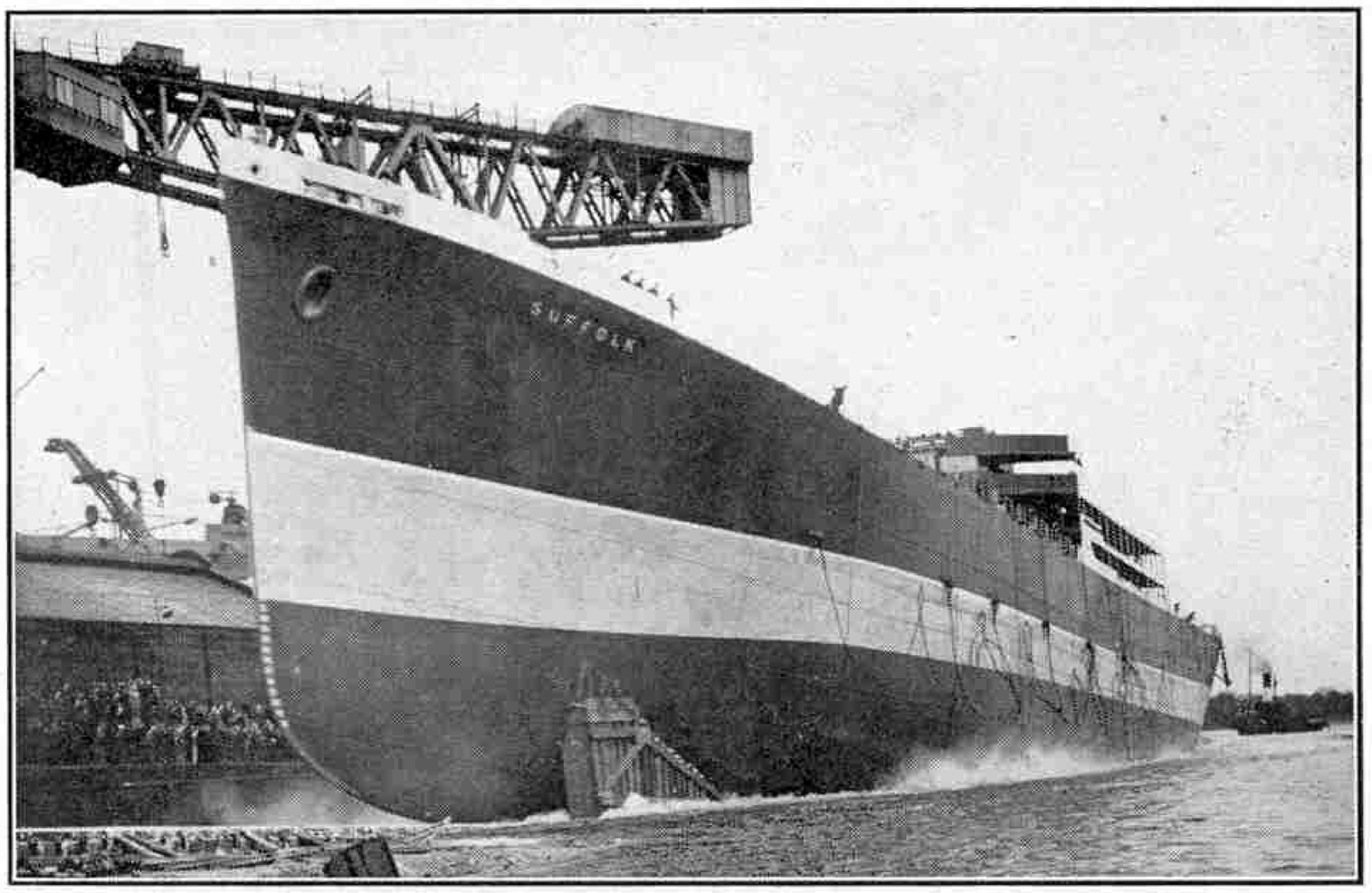
A new floating dock, constructed by Lübecker Flender-Werke, of Lübeck, Germany, for the Rumanian Government Authority has been stationed at Constanza, an important Black Sea port. It is of the self-docking type, with six pontoons, and has an overall length of 475 ft. 9 in. and a width between walls of 77 ft. 1 in. The lifting capacity is 7,874 tons, and about 30 minutes are required for immersion.

The dock is moored in a special basin inside the harbour, and is fully equipped for carrying out general ship repairs and overhauls. The electrical auxiliary machinery installed includes two 7-ton cranes mounted on the upper deck. The pump control is centralised in the dockmaster's cabin.

The Clyde's Largest 1939 Merchant Launch

The launch of the cargo motorship *"Suffolk,"* the largest merchant ship that will take the water on the Clyde this year, took place at Clydebank in May, and she is now fitting out afloat at the yard of her builders, John Brown and Co. Ltd. The *"Suffolk"* is a sister-ship to the cargo liners *"Essex"* and *"Sussex,"* recently constructed at Clydebank, and owned by the New Zealand Shipping Co. Ltd. She will join the earlier ships in the refrigerated and general cargo service between England, Australia and New Zealand.

The *"Suffolk"* has a length of 530 ft. between perpendiculars, and is of about 11,000 tons gross. The photograph of the launch of the vessel reproduced on this page shows her fine lines, and gives some idea of the attractive appearance that she will present on completion, with her straight stem, cruiser stern, single funnel and two-pole masts. The hull is of the shelter deck type, with three continuous decks. There are six cargo holds, in which the capacity of the insulated space is about 520,000 cu. ft. and that of the general cargo space about 220,000 cu. ft. Cargo will be dealt with by 20 derricks, each of 10 tons capacity, and one heavy derrick for 50-ton loads. The vessel will be propelled by two sets of Brown-Doxford Diesel engines developing 13,000 b.h.p. at 120 r.p.m.



The launch of the cargo motorship "Suffolk" at the Clydebank yard of John Brown and Co. Ltd., by courtesy of whom this photograph is reproduced.

"From Our Readers"

These pages are reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

Building a Model Aeroplane

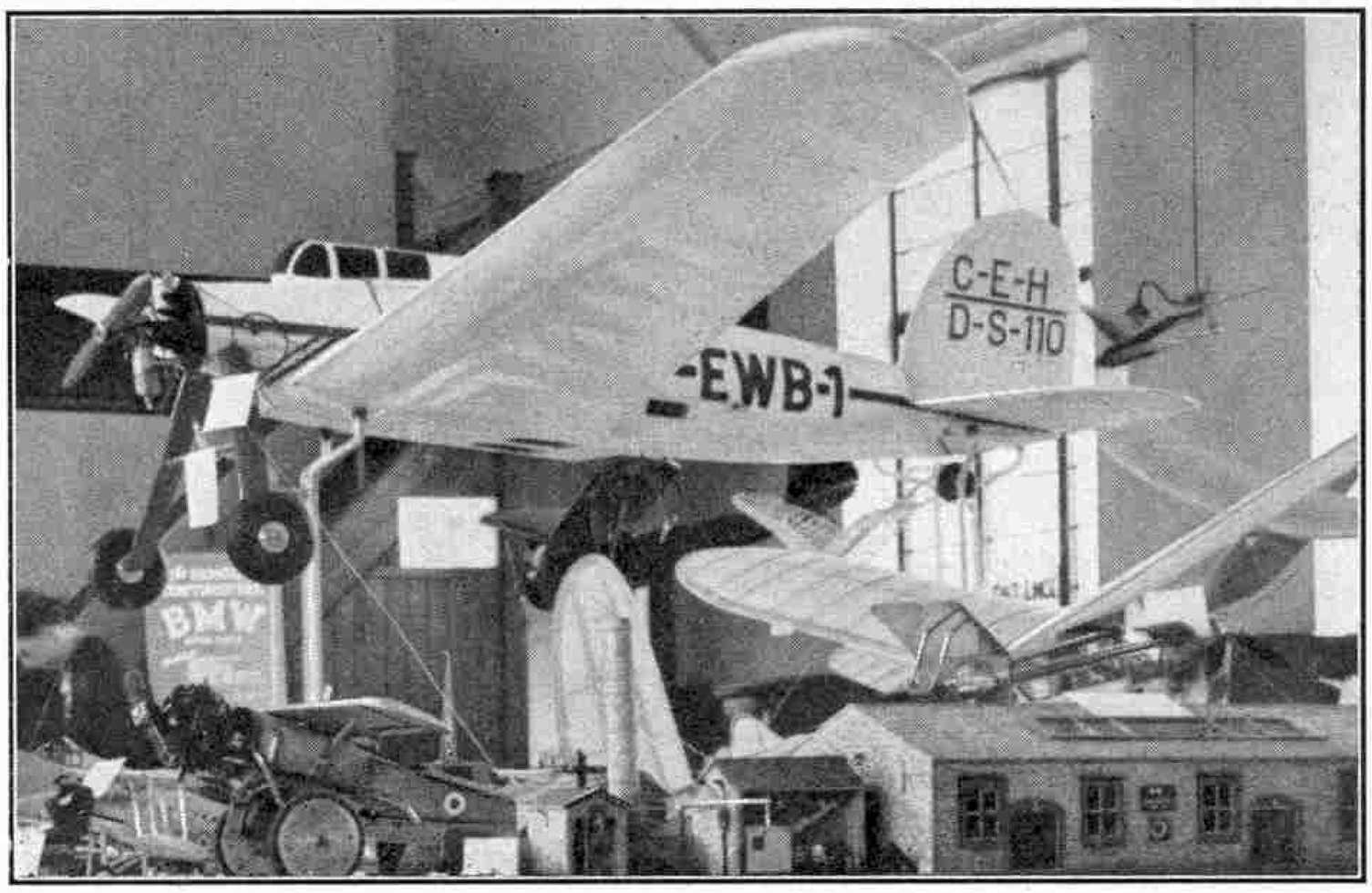
The illustration on this page shows a huge petrol-engined model aeroplane that I have constructed entirely unaided. My model is an exact replica of the PLW 4 aeroplane described by Major C. E. Bowden in his book *"Petrol-Engined Model Aeroplanes,"* and work on it was commenced in March 1938. Full-size plans of the fuselage, wings, tail unit, undercarriage and engine mounting, etc., were drawn first of all, and I then started to make the model in a spare room only some 7½ ft. square. As the model has a span of 8 ft. you will readily see that I could not assemble it in the room, and I had to take it downstairs into the backyard every time I wished to do this!

The fuselage was made first, this being of the monocoque, or stressed-skin construction, and having 18 frames or bulkheads and 30 stringers. I fitted a built-in battery box, booster plugs for warming up from a ground accumulator preparatory to flight, a time switch, tubes for taking the undercarriage and tail wheel, and a block balsa nose inside which is located the coil and condenser for the engine. The whole fuselage was then panelled with $\frac{1}{16}$" balsa and finally covered with Japanese silk, coated with full-strength dope and enamelled pure glossy white.

The wings were made tapering from 16 in. chord at the root to 11 in. at the tip, which is carved from block balsa and hollowed out internally for lightness. The wing halves are fastened together by bolts concealed in the wing roots. The wings also were covered with Japanese silk, 3 square yards being needed for this alone. The silk was hand-sewn to the underside of each rib in order to preserve the undercamber when the wing was doped. The wings were fastened on by rubber bands stretching from one wing root to the other over the fuselage through copper tubes in the cabin.

I power the aeroplane with an 18 c.c. Comet engine when flying her, and get a very good performance with it. This engine has a 17 in. diameter electron propeller, cone mounting, float feed carburetter, miniature sparking plug and contact breaker. Together with fuel, coil and condenser it weighs 26 oz., and develops 55 b.h.p. at 6,500 r.p.m.

E. BELLAMY (Hull).



A huge petrol-engined model aeroplane on show at the Exhibition of the Hull Society of Model Engineers, where it won first prize for model aircraft. Photograph by its builder, E. Bellamy, Hull.



A magnificent view of Gerainger Fjord, Norway, with a cruising liner at anchor. Photograph by V. L. Passer.

Cruising Round Norway in a Troopship

As one of a party of 1,100 schoolboys I greatly enjoyed a fortnight's cruise to Norway. We travelled on the British India Line troopship *"Dunera,"* and had the novel experience of sleeping in hammocks! We visited different places each day, and while we slept the ship steamed to its next destination. The most interesting town in Norway in our opinion was Bödö, for it is well within the Arctic Circle and is the country's most northerly town. Reindeer were strolling along its main street as placidly as if human beings didn't exist! Five miles from Bödö there is a glorious beach, with sand finer than I had ever seen before. While we were there we were given permission to swim, and off we went into the water. It was icy cold, and we had to wade out for about a half mile before being covered up to our shoulders.

Near the fishing towns, such as Stavanger, noted for its sardines, the fish are so abundant that if you throw your hook over the side and draw it up at once, you will find one on the end. The fishermen's boats are mostly motor yawls, but at some places fleets of smaller boats are towed to and from the fishing grounds by steamers. I enjoyed myself so much that if I had the chance I would gladly go again.

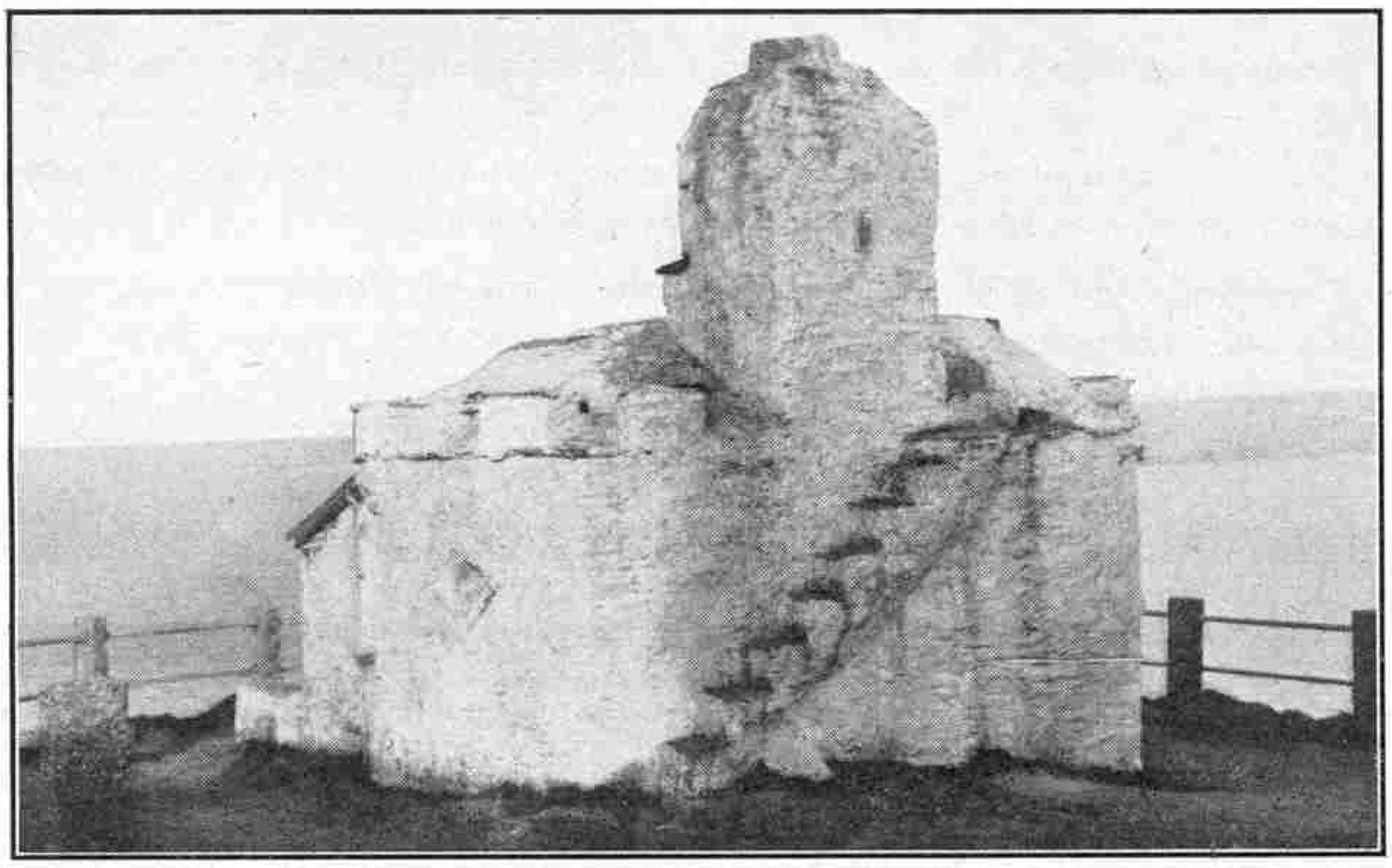
V. L. PASSER (London).

On the Lookout for Fish

An interesting building at Newquay, on the North Cornish coast, is the old "huer's" hut illustrated on this page. This curiously-shaped structure, with its odd windows and a flight of steps leading to the roof, stands on the headland and was formerly used by the huer, whose business it was to look out for shoals of herring and then to summon the fishermen and guide their operations. I believe there is a similar hut at St. Ives.

This relic of the past is rendered more interesting by the report issued recently of the first experiments in spotting herrings by aeroplane, and the subsequent aerial direction of drifters. This development, which has been largely successful, is due not to Cornish but to Scottish herring fishermen.

J. D. U. WARD (Oxford).



The old huer's hut at Newquay. Photograph by J. D. U. Ward, Oxford.

Coal Mines in the Arctic

Spitsbergen, a group of islands in the Arctic Circle about 400 miles north of Europe, was discovered in the 16th century by the Dutch, and now belongs to Norway. The islands are usually only frequented by fishing vessels, colliers, and parties of geologists, but last summer I visited them in the "*Empress of Australia*," a most interesting experience. As would be expected of islands situated in the Arctic Circle, they are heavily glaciated, and the glaciers come right down to sea level, their "faces" a beautiful greenish-blue colour. Even though it was the middle of summer snow was lying on low ground, though much of the land was covered with saxifrages and other small plants.

In Spitsbergen I saw the most northerly coal mines in the world, the presence of coal here showing that at one time the climate was much warmer than at present, and capable of supporting the forests that were the origin of the seams. The coal is worked at several places in the islands and exported to Norway. At King's Bay, our first port of call, we found the miners' huts, the light railway and jetty being dismantled, however, as it apparently no longer pays to work coal there.

Two of the most interesting things we saw at King's Bay were the skeleton of an airship hangar and a rough stone pillar on which were carved the names of Amundsen, Ellsworth and other Arctic explorers. These impressed on me how important Spitsbergen has been in recent years for Polar and transpolar flights. Almost all Arctic flights have begun or ended there. In 1897 the first attempt to reach the North Pole by air started from Spitsbergen, when Andrée set off in a balloon. The Amundsen-Ellsworth expedition of 1925, Byrd's and Amundsen's successful flights in 1926, the "*Italia*" in 1928, all started from there, while Hubert Wilkins landed there after flying across the Pole from Alaska. It was at Spitsbergen that the last was seen of Amundsen, when the "*Italia*" was reported missing and he volunteered to go in search of her, and was himself lost.

W. L. DUDLEY (Halifax).

The "*Union Limited*"

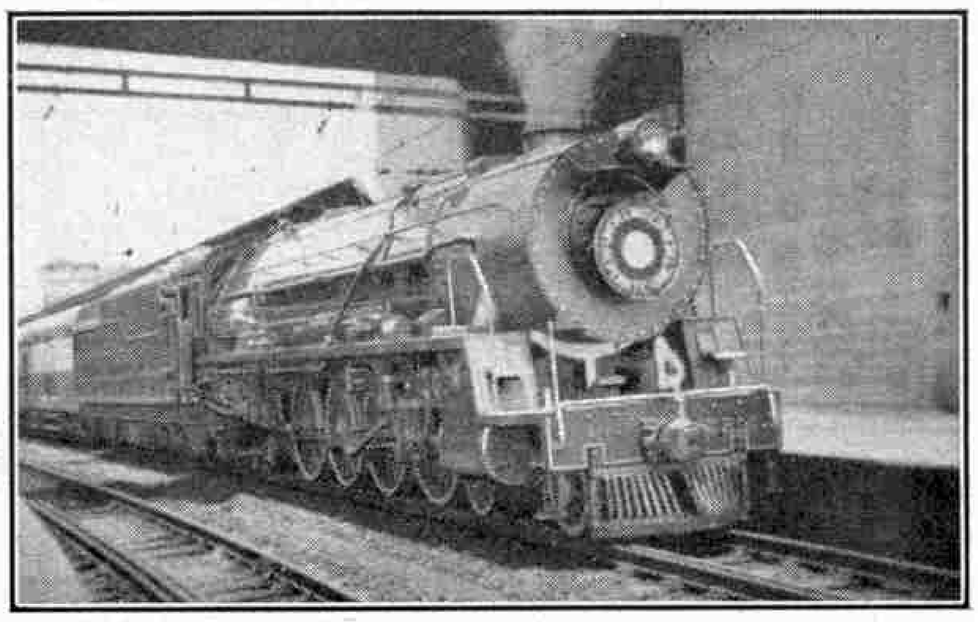
An event of more than usual interest in Johannesburg is the departure for the south of the "*Union Limited*" train from Park Station, for not only is this the fastest and most luxurious train in South Africa, but it is also unique in its appointments and appearance, considering the comparatively narrow gauge of the track on which it has to travel.

The train is composed of about 10 articulated sleeping coaches of modern design, together with an air-conditioned dining saloon, a lounge-observation coach, and a kitchen coach. During the day the sleepers furnish the last word in travel comfort, and at night the introduction of spring mattresses and sterilized bedding converts each compartment into a comfortable bedroom. Each coach has its own steward, who may be summoned by the touch of a bell push to produce anything from a cool drink to a full-course dinner cooked to perfection in the kitchen coach.

The colour scheme adopted for the train is rather striking. The coaches are royal blue and cream, with two narrow gold lines on the blue running their entire length. The locomotive is shiny black, in accordance with standard South African practice.

The train leaves Johannesburg every Thursday at 12.30, and covers the 956 miles to Capetown in 26 hrs., arriving at Monument Station in time to transfer its passengers to the mail-boat for England.

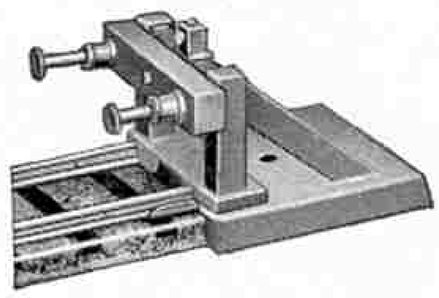
N. R. TUNLEY (Johannesburg).



The "Union Limited" train in Park Station, Johannesburg, before leaving for Capetown, nearly 1,000 miles to the south. Photograph by N. R. Tunley, Johannesburg, South Africa.

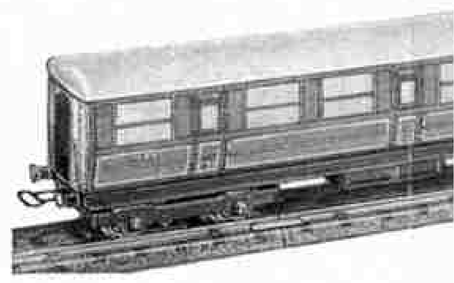
HORNBY DUBLO

BUFFER STOP



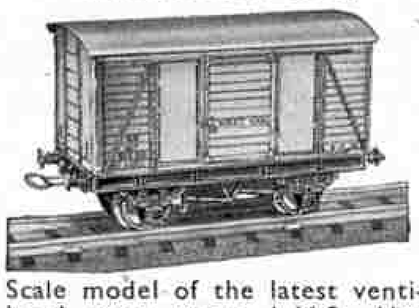
A particularly realistic model of a type to be seen in the sidings in most goods yards. Price **10d.**

CORRIDOR C L.N.E.R.



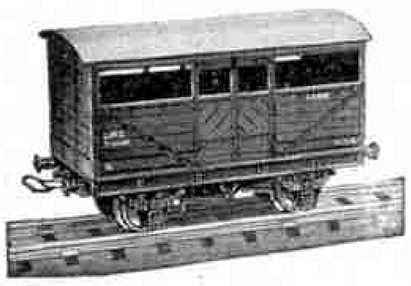
An accurately detailed model o teak-finished Corridor Coach.

MEAT VAN L.M.S. and S.R.



Scale model of the latest ventilated meat vans; L.M.S. Van Bauxite brown and S.R. Van buff. Price **1/6**

CATTLE TRUCK L.M.S. and G.W.R.



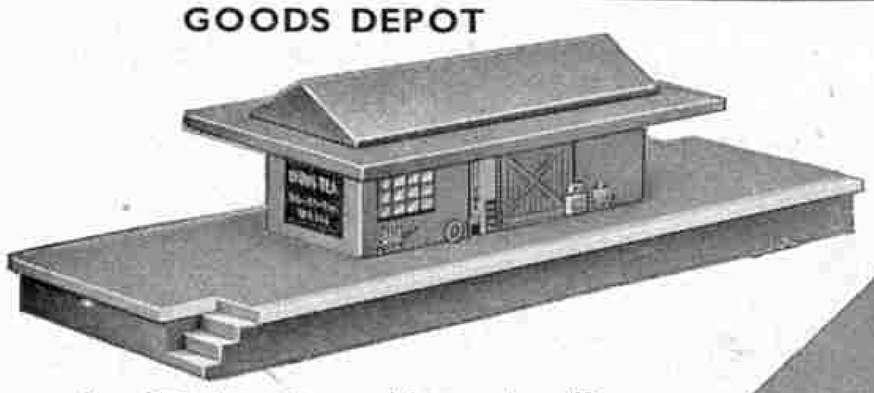
An attractive vehicle, fully detailed and typical of up-to-date practice of the two companies. Price **1/6**

FISH VAN N.E.



A characteristic N.E. van used for perishable traffic. Finished in red-brown with white roof and lettering. Price **1/6**

GOODS DEPOT



A realistic depot in wood for goods traffic. Size: Length 12 in., width 4 in., height 2⅞ in. Price **4/11**

A perfect model ra

The new Hornby-Dublo System, Gauge 00, provides the ideal home railway. You can lay out a complete and realistic railway on your dining-table!

Hornby-Dublo Locomotives are fitted with motors (either clockwork or electric) of a power and reliability never before achieved in this gauge. All the movements of the Electric Locomotives are perfect—starting, stopping, reversing and speed regulation are all carried out by the movement of one lever.

Automatic couplings are fitted to all Coaches, Vans and Wagons. The Signals are realistic working models of the latest upper-quadrant type and the Buffer Stops have working heads.

HORNBY-DUBLO ELECTRIC & CLOCKWORK PASSENGER TRAIN SETS

ELECTRIC

Hornby-Dublo Electric Passenger Train Set, L.N.E.R. Contains Streamlined Six-coupled Locomotive **"Sir Nigel Gresley"** (Automatic Reversing), Tender, Two-Coach Articulated Unit, Dublo Controller No. 1, seven Curved Rails, one Curved Terminal Rail and two Straight Rails. (To be operated from a Dublo Transformer, not included in Set.) Price **70/–**

Where the mains supply is D.C., or there is no supply, the above Set is available with Dublo Controller No. 1a (for use with 12-volt accumulators) as follows:

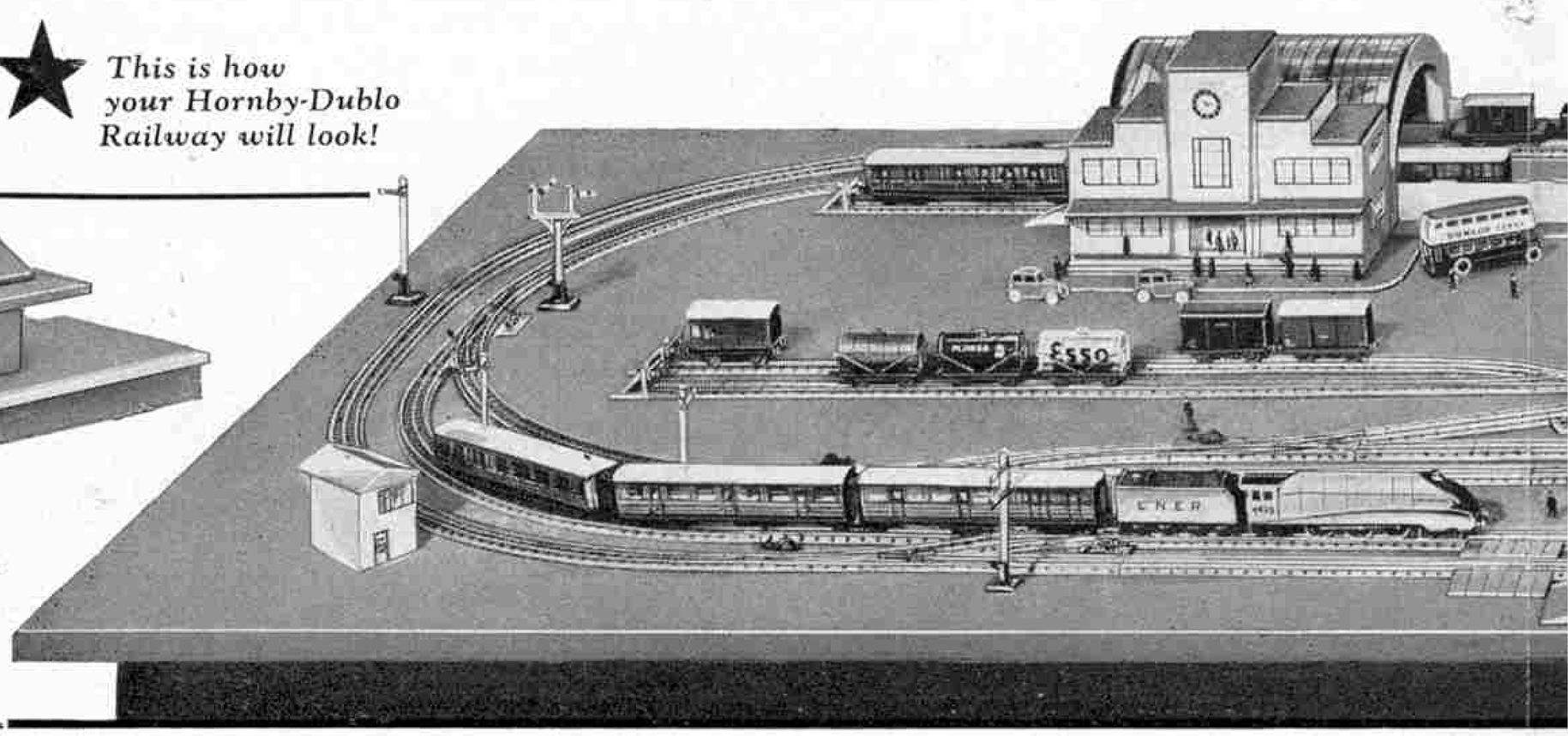
Electric Passenger Train Set, L.N.E.R. (With Dublo Controller No. 1a.) Price **61/6**

CLOCKWORK

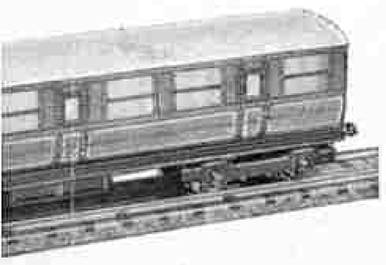
Clockwork Passenger Train Set, L.N.E.R. Contains Streamlined Six-coupled Locomotive **"Sir Nigel Gresley"** (Reversing), Tender, Two-Coach Articulated Unit, eight Curved Rails and two Straight Rails. Price **39/6**

HORNBY-DUBLO TRAINS ARE MANUFACTUR

★ *This is how your Hornby-Dublo Railway will look!*

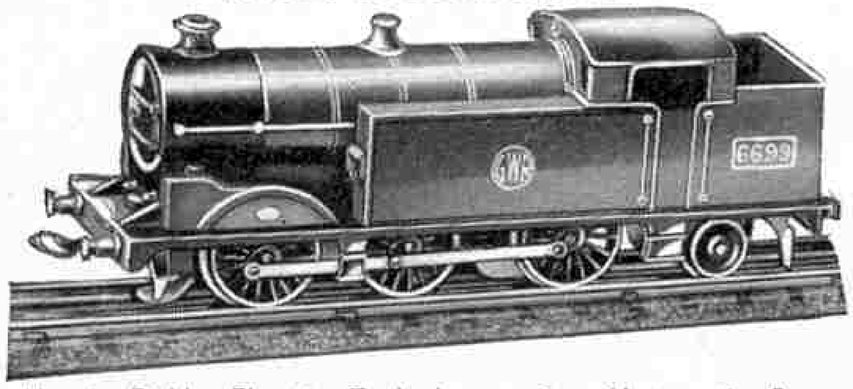


DOR COACH
.N.E.R.



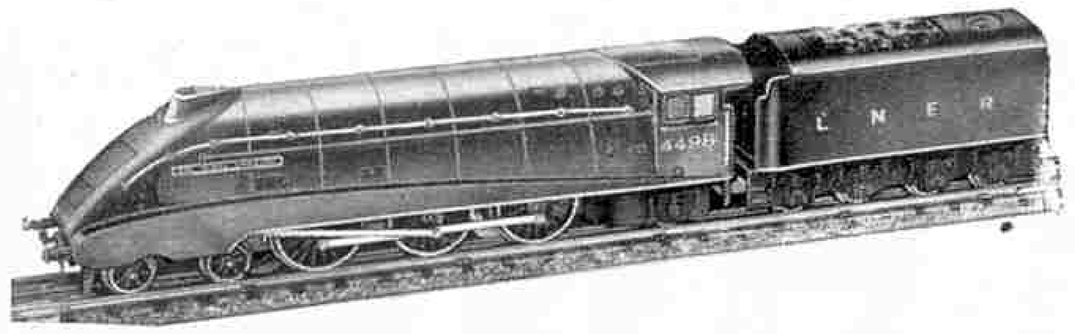
model o a standard L.N.E.R. Coach. Price **3/6**

TANK LOCOMOTIVE



Hornby-Dublo Electric Tank Locomotive (Automatic Reversing). Available in L.M.S., L.N.E., G.W. or S.R. colours. Price **17/6**

STREAMLINED EXPRESS LOCOMOTIVE



Hornby-Dublo Electric Streamlined Locomotive "Sir Nigel Gresley" (Automatic Reversing) and Tender L.N.E.R. Price **29/6**

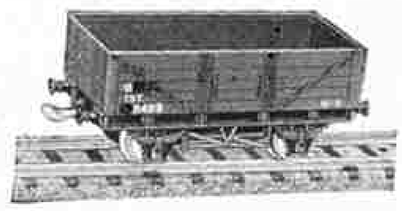
railway on a dining table!

Hornby-Dublo Electric Trains operate on **Direct Current** at 12 volts. This current may be obtained either from **Alternating Current Mains Supply** through a Dublo Transformer and a Dublo Controller No. 1, or from a 12-volt accumulator and a Dublo Controller No. 1a.

The Dublo Transformers are specially designed for these Trains; no others should be used.

Write to Meccano Ltd., Dept. DF, Binns Road, Liverpool 13, for a free copy of the special folder giving details of the Hornby-Dublo Railway System.

12-TON OPEN GOODS WAGON



A model of the standard 12-ton Open Goods Wagon. Available in the designs and colours of the four railway groups. Price **1/4**

PETROL TANK WAGON "ESSO"



Finished in buff with bright blue lettering. Price **2/6**

HORNBY-DUBLO ELECTRIC & CLOCKWORK TANK GOODS TRAIN SETS

ELECTRIC

Electric Tank Goods Train Set, L.M.S., L.N.E.R., G.W.R. or S.R. Contains Six-coupled Tank Locomotive (Automatic Reversing), Open Goods Wagon, Goods Van, Goods Brake Van, Dublo Controller No. 1, seven Curved Rails, one Curved Terminal Rail and two Straight Rails. (To be operated from a Dublo Transformer, not included in Set.) Price **55/–**

Where the mains supply is D.C., or there is no supply, the above Set is available with Dublo Controller No. 1a (for use with 12-volt accumulators) as follows:

Electric Tank Goods Train Set. (With Dublo Controller No. 1a.) Price **46/6**

CLOCKWORK

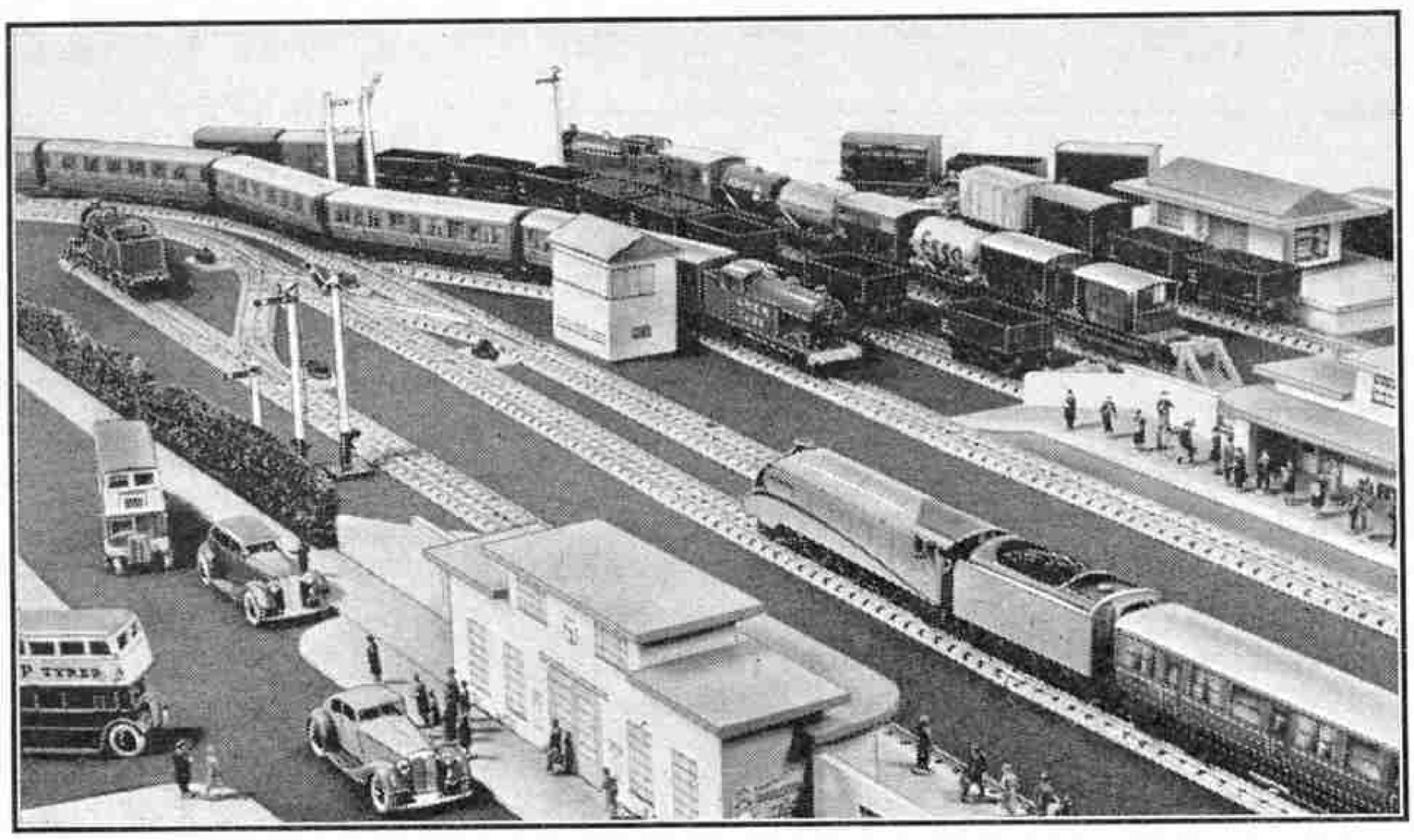
Clockwork Tank Goods Train Set, L.M.S., L.N.E.R., G.W.R. or S.R. Contains Six-coupled Tank Locomotive (Reversing), Open Goods Wagon, Goods Van, Goods Brake Van, eight Curved Rails, and two Straight Rails. Price **27/6**



'URED IN LIVERPOOL BY MECCANO LIMITED

Stations and Goods Yards

Plans for Hornby-Dublo Layouts



A four-track station layout arranged with Hornby-Dublo components. The platform lines consist of loops that are led off the main tracks in the centre by means of points.

THERE is no fun in running trains on a miniature track that is not realistic. It is therefore important when planning a layout to be sure that the formation adopted will be suitable for the operations it is intended to carry out. Stations and goods yards are the places where the movements of trains are influenced to the greatest extent by the layout, and the arrangement of these is the subject of this article.

The simplest station layout imaginable consists of a Hornby-Dublo Main Line Station served by a single track. This may easily form a starting point for larger and more interesting schemes. The first requirement probably is the addition of a siding where the coaches form passenger trains or the goods vehicles used for freight traffic can be left when not actually in running. Such a siding is best arranged in what is known as the trailing direction to the main line; that is to say it is entered only by means of a backing movement when trains are running in the direction normally followed, so that engines working into the siding are not trapped at the buffer end by their trains. A simple turnout for the main track is therefore required and this is formed by means of points; whether these are of the Right-hand or the Left-hand type will depend on which side of the main track the siding is to be and on the normal direction of running on the main line. On many single track systems one-way traffic is usually operated, its direction being according to the preference of the individual railway owner.

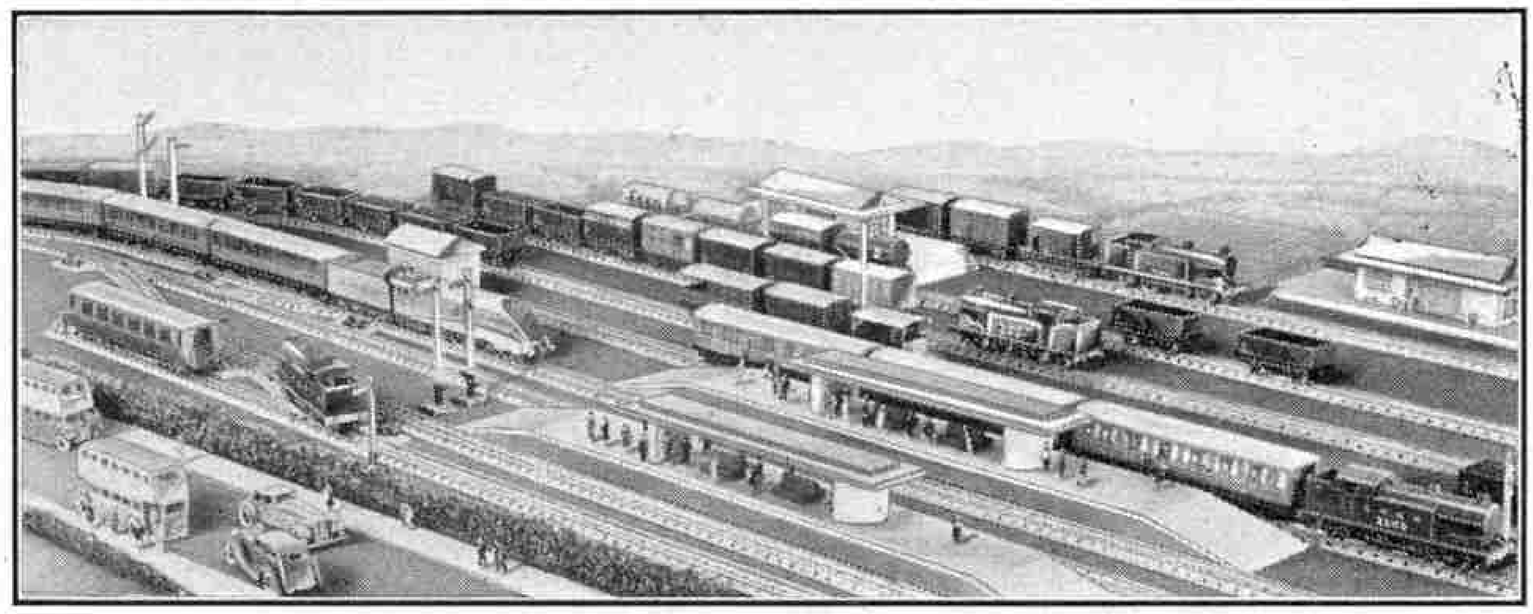
When laying in the points we must make sure that the rails are held in line by means of the connecting "fishplates" and that the centre connecting clips are truly in position. The next step is to add a curved half rail to form a reversed curve in conjunction with the turned out portion of the points, and so bring the diverging line parallel to the main track. This is allowed for in the design of Hornby-Dublo track parts, the half rails being equal in length and radius to the curved member of the points. All that remains now is to connect up to the free end of the curved rail as many straight rails as space permits.

A siding so formed is terminated by one of the splendid little Buffer Stops of the Hornby-Dublo Railway System. This represents the usual timber-built type of stop and has actual spring buffers. It is finished in grey, with a red buffer beam and warning lamp, and is a most useful and effective working accessory. The joining up of a buffer stop to a length of siding is not difficult. Care must be taken to see that the stop is fitted to the end of the straight rail that has two slots formed in the turned over portion of the track base. These slots serve to receive the spring wire clips that are provided on the base of the Buffer Stops.

This completes our siding, which makes a useful addition to the system. Trains that are to enter the siding draw past the points until the last vehicle is well clear of the switch rails. When the road is made by throwing over the points operating lever the engine is reversed and the train backed in, the switch rails then being restored to the normal position for main line traffic.

With this single siding arrangement it is possible to have quite an amount of fun. A useful development for small layouts is to place the Hornby-Dublo Goods Depot by the siding line, thus making provision for the loading and unloading of freight traffic. A more ambitious arrangement, however, would be to convert a dead-end siding into a running loop by the provision of additional points at what has been up to now the buffer stop end of the siding. This increases the usefulness of this track enormously, for trains then can enter the loop directly off the main line and the reversing movement previously necessary is done away with. Hornby-Dublo Track has been carefully designed to make this arrangement easy. The straight part of the running loop contains one straight rail fewer than the length of the main line situated between the two points leading to the loop.

Very often the installation of such a loop leads to the extension of running in both directions on a single line railway. One train is then held in the loop while the other, travelling in the opposite direction, is traversing the main line, an operating scheme that has frequently been dealt with in the *"M.M."* This may suggest the expansion of the station premises either by the addition of a further Main Line Station alongside the loop, or by means of one of the useful Island Platforms. Both arrangements give realistic results, and the use of the Island Platform has the further advantage that another track, possibly a terminal bay, can be accommodated on its outer side, thus providing for local



Another station layout with goods sidings in the background. The passenger station is formed by the use of two Hornby-Dublo Island Platforms used as described in this article.

trains terminating their journeys at this point.

The track and station "units" so far described can be extended almost indefinitely, provided that sufficient space is available. A system consisting otherwise of double track may incorporate a platform loop from each of the main lines, as shown in the illustration opposite. In this case an "up" and "down" main line is provided for non-stopping trains, but those calling at the station can be run into one or other of the loops, according to their direction. In the illustration a through express is dashing along the main line while in the opposite direction a heavy local train is coming down the platform loop. The loop track in the foreground is carried forward beyond the points leading to the main line. The spur thus formed is terminated by Buffer Stops and it makes quite a useful "loco road" where engines finishing their work can stand for a while after their release from trains, until they proceed to the locomotive depot.

A similar track layout can be used with two Island Platforms, the only difference being that these are placed between the main line and the loop in each case, thus providing four platform faces, one for each track. The advantage of this scheme is that if required a train can be halted at the platform no matter which line it is on. In fact, four trains can be standing in the station at once. This arrangement is very effective, as can be seen from the upper illustration on this page.

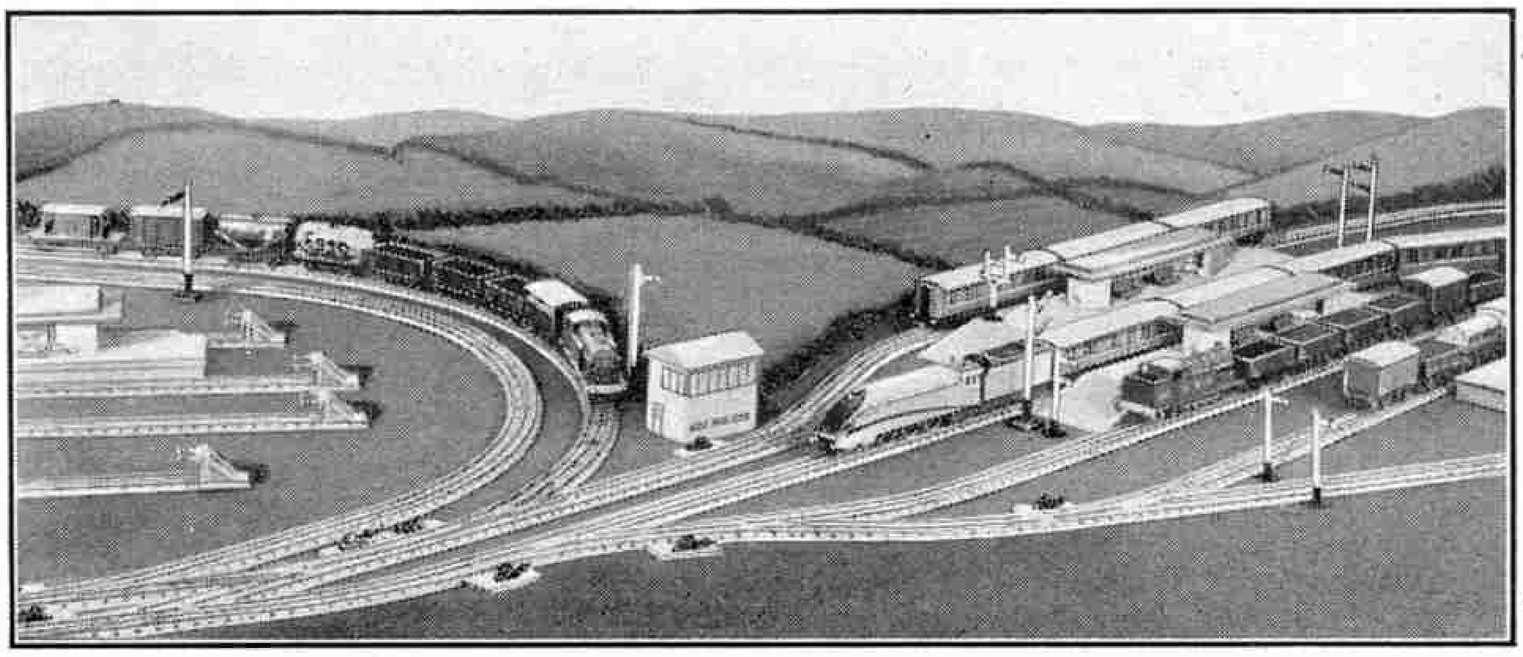
Further developments can include the provision of run-round loops, with engine spurs if necessary, for the use of locomotives dealing with local trains. Short spur tracks are useful too for holding odd vehicles such as "through coaches" that are in course of being worked from one point to another. The illustration referred to in the previous paragraph shows a spur track used in this way.

The Hornby-Dublo Stations themselves are interesting structures, and their pleasing design adds considerably to the effectiveness of the layout arrangements just described. Taking the Main Line Station first, this is made of wood like all Hornby-Dublo buildings, and is splendidly built in modern style, with handsome station buildings and a flat roof. Its platform length is 24 in., so that it can accommodate a train of three coaches. Various advertisements can be seen about the station and its realistic appearance is further improved by the many details shown on it, including a characteristic clock face.

Printed name slips gummed on the back are packed with each station and from these the owner of a station can choose one of four names for it. They are "Berwick," "Penrith," "Truro," and "Ashford," representing respectively the L.N.E.R., L.M.S., G.W.R. and S.R. companies.

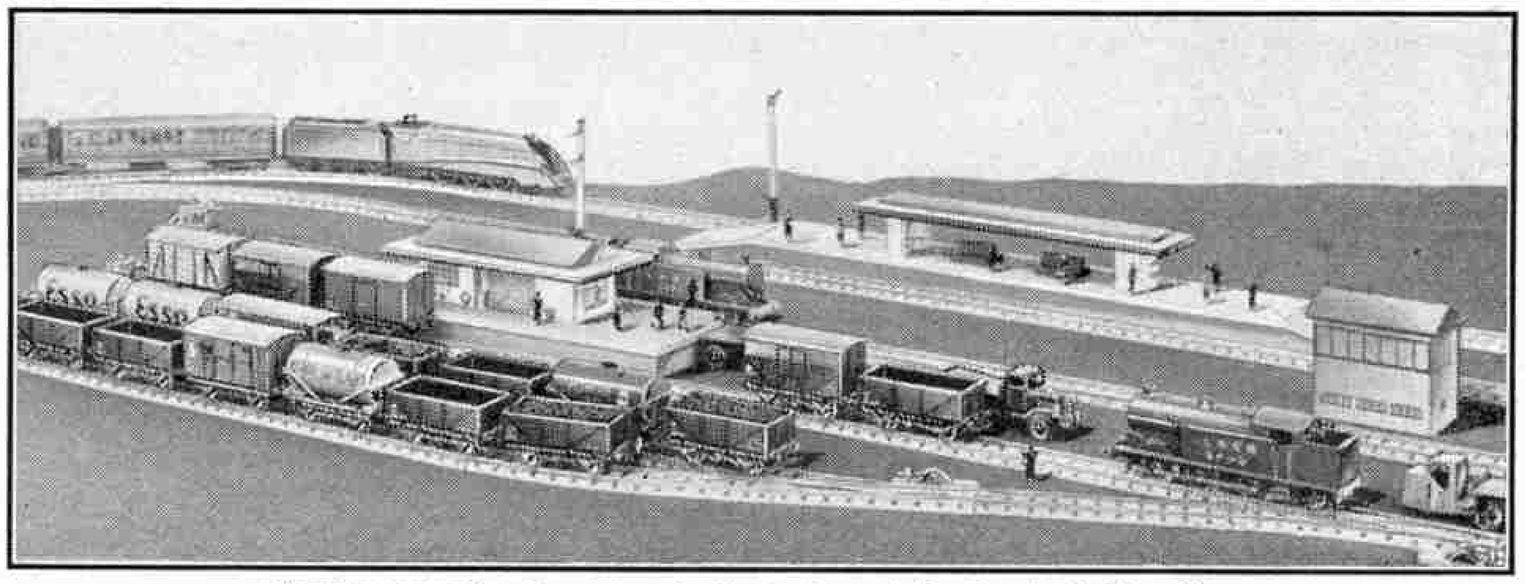
The Hornby-Dublo Island Platform also is built of wood, and is similar in style to the Main Line Station, so that it can be employed very effectively in conjunction with it. It has an open shelter, consisting of semi-circular ends supporting a flat roof, and four back-to-back seats are provided for the use of passengers. Its length is the same as that of the Main Line Station.

A goods yard layout can provide a great deal of fun if it is well arranged, and the Hornby-Dublo System certainly permits a really interesting goods yard to be laid down in a comparatively small space. A form of yard frequently seen is that consisting of a number of dead-end sidings parallel to one another, each of them branching off from a track which is thrown off diagonally from the main line. This type of yard is useful, but a disadvantage to which it is subject is the same as that considered previously in the case of a simple dead-end siding. A locomotive that runs into the yard at the head of its train is trapped at the buffer stops. Unless another locomotive is kept permanently in hand for shunting purposes it is thus impossible for the arriving engine to deal with its train itself. It is advisable therefore always to provide what may be termed a reception road in the form of a long loop into which a goods train requiring to shunt can be run. Then, if necessary, the train engine can run round its train and carry out shunting operations. The sidings themselves are connected to the reception loop and not directly to the main line. This prevents shunting operations interfering with main line traffic. A scheme sometimes used is to prolong the reception loop by means of spur tracks at each end. These will be found very useful during yard operations, especially if a fairly long train is being shunted.



An attractive scene on a Hornby-Dublo railway. The express passes through the station while the goods train coming off the branch line is held at the signal.

Fun with Hornby-Dublo Clockwork Trains



Shunting operations in progress in the goods yard of a Hornby-Dublo railway.

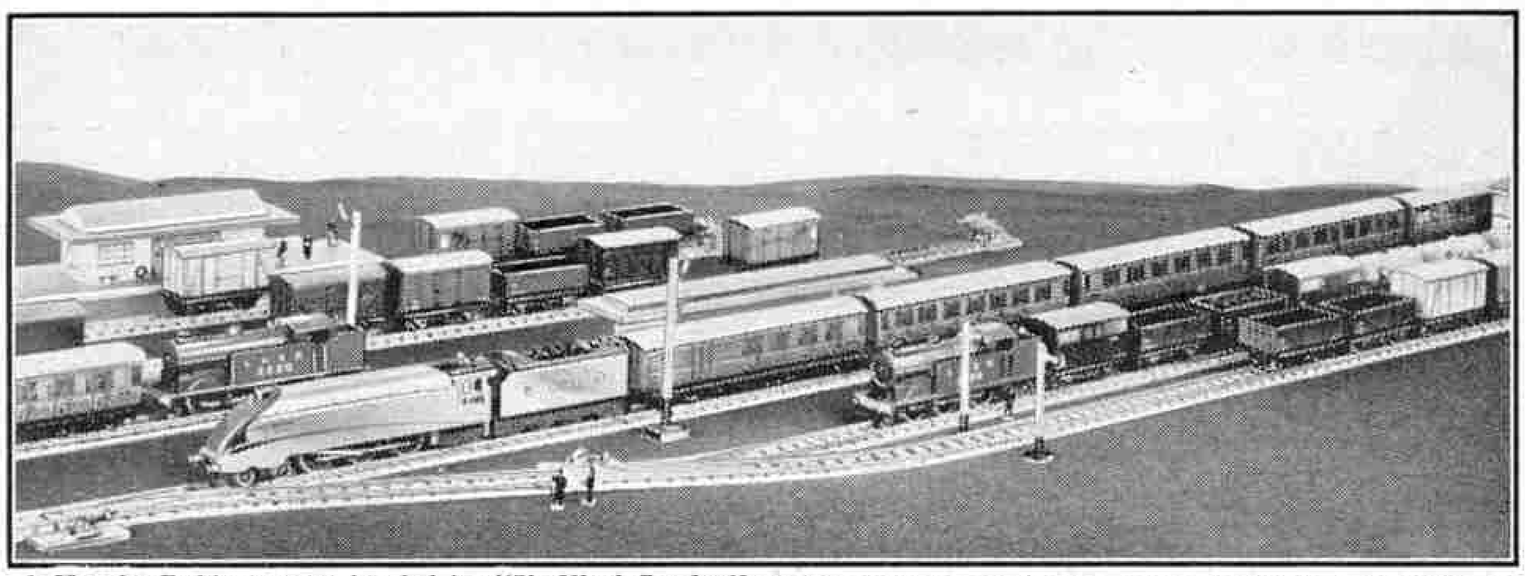
WHEN owners of Hornby-Dublo Clockwork Locomotives get past the stage of merely winding up the mechanism and seeing the engines haul their trains round the track, they are interested to find how easily their engines can be controlled and how closely their movements can be made to resemble those of the locomotives of real railway working.

A clockwork layout may not afford the same degree of remote control as an electrically-operated system, but the Hornby-Dublo clockwork mechanisms are so carefully designed, and so efficient in operation, that their "ways" can be learned with a little practice and they will be found very consistent indeed once they have been run in and have settled down to work.

Advantage can be taken of this regularity of running on a given layout to make the engines and trains operate to a settled running programme, in which certain distances are run between stops, without any re-winding or handling of any kind. In order to work out such a scheme it is necessary to make a series of tests with the locomotives with various loads. Probably the first to run over a given distance, say to a station, will result in the latter being over-run. The run should then be made again with the engine not quite so fully wound, and by varying the number of turns of the key that are given it is possible after some experimenting to make the engine stop practically where required. When this measure of control is attained it is a good plan to make a note of the results obtained. Although we refer to turns of the key as a matter of habit, actually each twist of the hand when winding up moves the key through half a revolution only and it would therefore be more correct to refer to half-turns.

Cn an oval layout occupying a space of 6 ft. by 3 ft. it will probably be found that 11 or 12 half-turns of the key will wind up the motor sufficiently to take the streamlined express locomotive and the twin articulated unit about 3½ times round the track. If 12 half-turns prove too much we can make use of the characteristic "clicks" of the ratchet to note the amount of winding necessary after the eleventh half-turn, as we have previously suggested in these pages. Perhaps 11 half-turns and two "clicks" may be not quite enough, but an additional "click" gives the result required. Judgment must be exercised as to the exact point at which to stop winding, but after a little experience it is not difficult to give the right amount of winding up.

Some really good fun can be obtained on a layout consisting say, of a main oval track with a station and loop line at one side and a pair of sidings at the other. With both a passenger and a goods train available a variety of interesting operations can be performed. As the line includes a siding the goods train can be held there while the express, headed by the splendid 4–6–2 streamliner *"Sir Nigel Gresley,"* speeds along the main line and then stops at the required point, which of course should be the station. The 0–6–2 Tank Engine, which is in charge of freight operations, is now wound up sufficiently to carry it and its train from the siding, along the main line and into the loop at the station. There the goods train can wait and *"Sir Nigel Gresley"* then backs the coaches of its track into the siding, giving the goods train a clear line so that it is able to complete its journey before the passenger train gets the "right away" once again. Each train therefore is able to have a period of running, even though the main line consists of single track. This kind of running is good railway-like fun, but even a single train will give splendid entertainment to its owner.



A Hornby-Dublo express headed by "Sir Nigel Gresley" speeds along the main line while the goods train waits in the loop line.

In local passenger train working the regularity of running of clockwork locomotives is particularly valuable. On a layout of the type that we have been considering station-to-station runs can consist of single circuits of the oval track. When the end of the journey is supposed to be reached the engine should be wound just sufficiently to enable it to run round its train by means of the loop line.

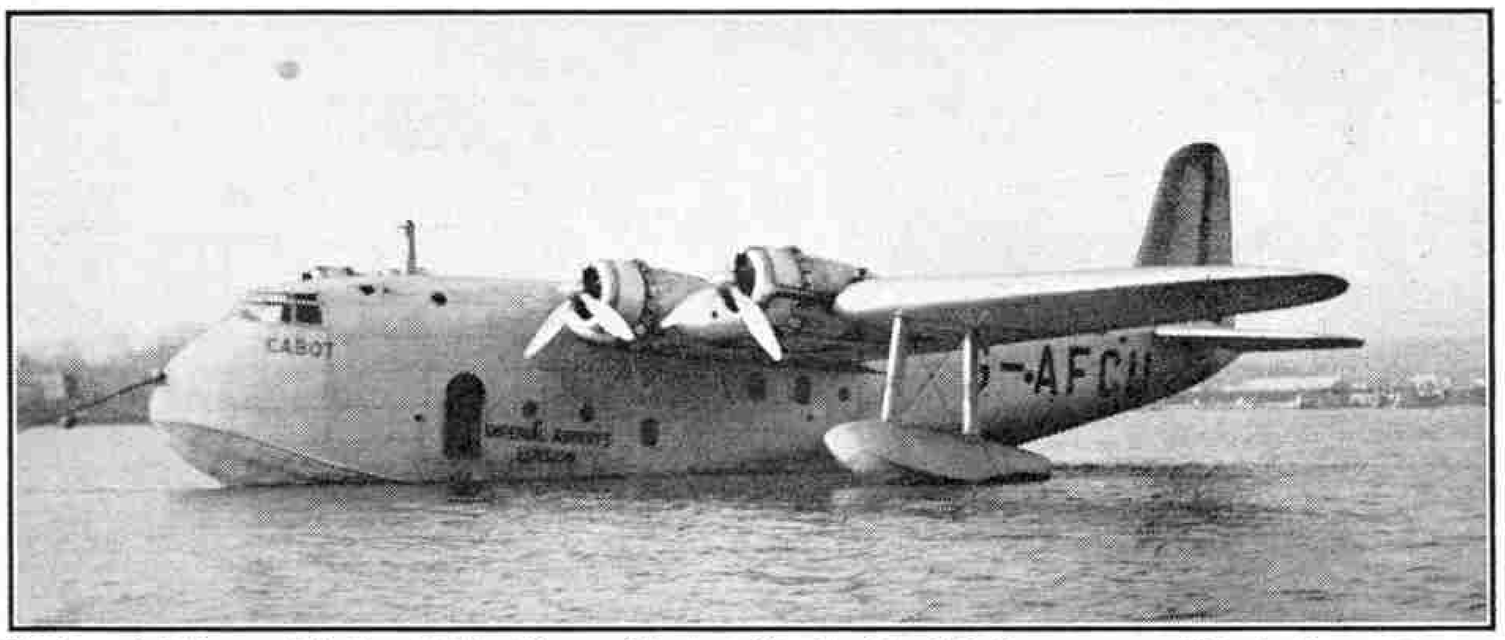
On larger layouts more intensive working of a realistic character can be carried out. At the terminal points the "turnover" system of engine working will be most effective, whereby an arriving engine stays at the platform until its train has been taken away by a fresh locomotive, afterwards proceeding to the engine siding and waiting to take over the next arrival. An effect to aim at should be that arriving engines should have sufficient power left in them to allow them to run out to the engine line to prepare for another journey.

The making up of trains before a running programme by means of Hornby-Dublo Clockwork Locomotives can be quite fascinating. The automatic couplings on Hornby-Dublo rolling stock ensure the satisfactory connection of the various vehicles, and after a little practice the "driver" will become quite skilled in the matter of judging the small amounts of winding that are necessary for the engine to make a succession of movements.

The shunting of trains and the distribution of the vehicles over a number of roads also can be carried out successfully with clockwork engines, the duties of the driver and the shunter being combined in the one operator. The different vehicles or "cuts" of vehicles can be made to part company on the run, as they are by "fly-shunting" in real practice, if the actual uncoupling is carried out before the engine starts to propel the train. The standard Hornby Shunter's Pole is a most useful piece of equipment for this purpose. After uncoupling the handle of the Pole is held vertically between the adjacent couplings at the point where the train is to be divided in order to prevent them from engaging as the engine pushes the wagons. On retarding the engine smartly the wagons to be cut off from the main train then go on to an easy stop. If the winding of the engine is correctly managed the stopping of the locomotive can be carried out without the operator having to touch the engine.

An interesting development of this scheme can be made use of when the engine is to leave the last of its wagons in the siding. It will be noticed that the automatic coupling fitted to the front end of the Hornby-Dublo Tank Locomotive is not provided with the twin projecting "nibs" that are characteristic of the other automatic couplings. When the engine is shunting "chimney first" this coupling can be placed over the coupling of the next vehicle and the two will part company when the engine is retarded. Very little practice is required to carry out this efficiently.

British Transatlantic Aircraft



The Imperial Airways flying boat "Cabot," one of the two aircraft with which the company will begin its experimental transatlantic service this month. Photographs by courtesy of the Bristol Aeroplane Co. Ltd.

THE Imperial Airways transatlantic service is expected to begin this month with *"Cabot"* and *"Caribou."* These machines belong to the modified Empire class Short flying boats, fitted with "Bristol" Perseus XIIc sleeve valve engines. Another boat of this class is *"Clyde,"* which is destined for the New York–Bermuda service, and *"Connemara,"* the flying boat that was burned out at Hythe, Southampton, on 19th June, also was of this class. The tanks of this aircraft were being refilled from a barge in readiness for a test flight by night when there was an explosion and fire broke out on the barge. Flames spread quickly to the flying boat, in spite of all efforts to detach the barge, and the *"Connemara"* finally sank.

"Cabot" was the first of these flying boats to be launched, and on 2nd December last she took off from the River Medway for the first time at a gross weight of 46,000 lb., which is 5,500 lb. more than that of the standard "Bristol" Pegasus-engined Empire boat, and 1,000 lb. more than the maximum figure registered by *"Caledonia"* or *"Cambria"* during the series of transatlantic survey flights in 1937. In spite of this heavy load, combined with the adverse conditions imposed by a low tide and a cross-river wind, the take-off occupied less than 20 seconds.

Since then, as a result of extensive tests, it has been decided to use constant-speed airscrews instead of the two-position controllable pitch type previously fitted, thus enabling full advantage to be taken of the high torque capabilities of the Perseus sleeve-valve engines, which provide a total take-off output of 3,560 b.h.p. at a crankshaft speed of 2,700 r.p.m. For climbing, some 2,800 b.h.p. is available up to the rated altitude of 4,000 ft. and although the final official figures have not yet been issued, it is understood that *"Cabot"* can now reach this height in little more than seven minutes from the start of the take-off run, carrying the full take-off load mentioned above. This must be regarded as an excellent performance, reflecting much credit both on the aircraft as a whole and on the power plant.

The total normal cruising power is 2,040 b.h.p., and the maximum output for all-out level flight is 3,260 b.h.p. Although these figures are slightly less than for the Pegasus-engined boats, the cruising speed is about the same whilst the maximum speed is, if anything, rather higher. It may therefore be inferred that the reduction in power has been off-set by an aerodynamic advantage in nacelle form, the Perseus engine cowl being some three inches smaller in diameter than that of the Pegasus.

In any case, the lower power required to maintain a given cruising speed will naturally enhance the benefit of reduced specific fuel consumption offered by the Perseus sleeve valve engines for the long-distance flights.

In external appearance *"Cabot"* and her sister craft are almost identical with their predecessors, the basic aerodynamic design and overall dimensions being unaltered. The hull and wings have been considerably strengthened by the use of stiffer structure members, however, and of thicker-gauge sheeting for the stressed-skin. An interesting new feature in the hull is the provision of a retractable, transparent dome to enable the navigator to take celestial observations with an entirely unobstructed view.

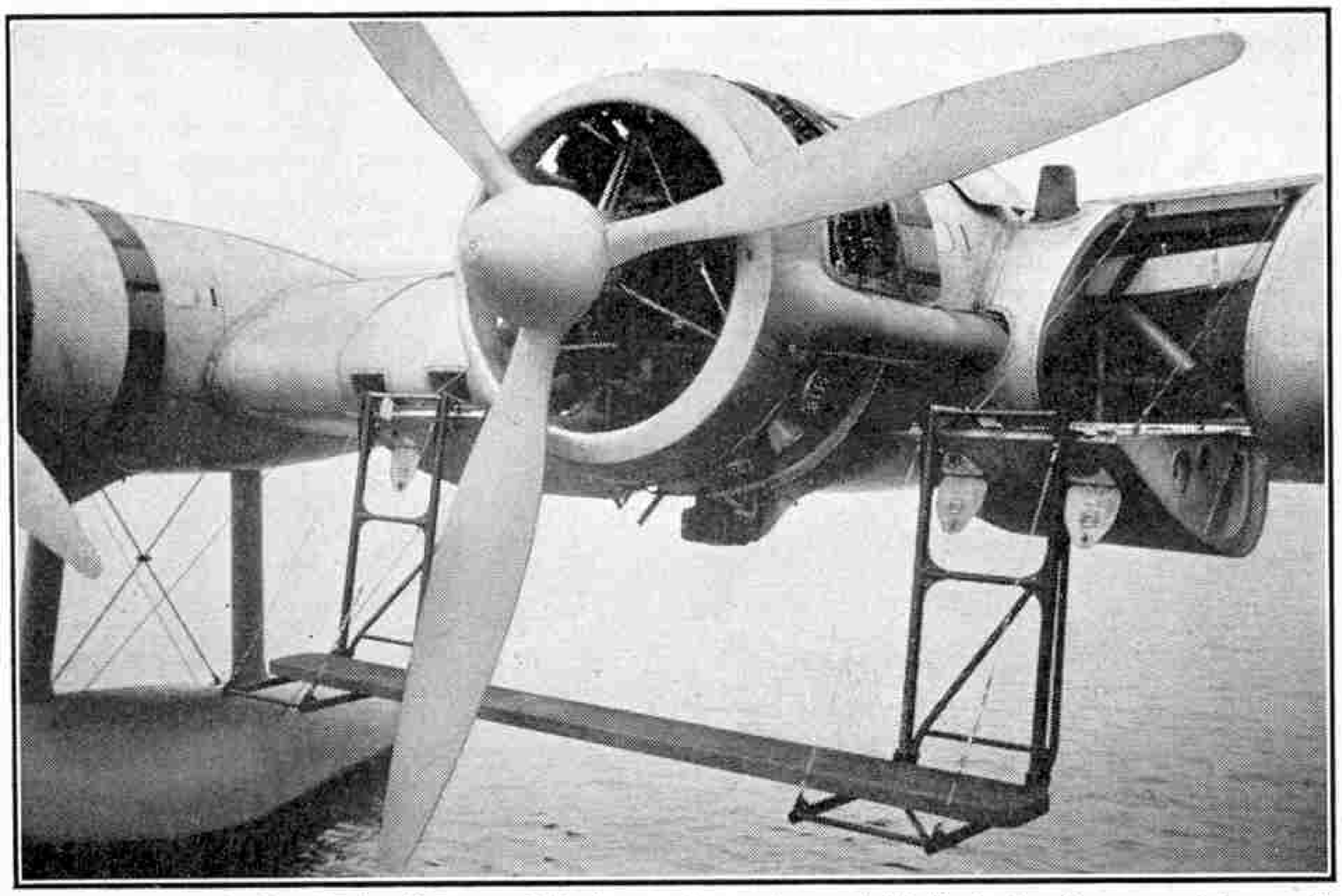
Although the general arrangement of the engine nacelles remains the same as in the older boats, the new power units are readily identifiable by two distinctive external features. The 12 ft. 9 in. diameter constant-speed airscrews are provided with nose-spinners, which, incidentally, incorporate airscrew de-icing oil-slinger rings, while the exhaust manifolds are of the latest "Bristol" shrouded type, giving important advantages in cooling characteristics under certain adverse conditions. Standard "Bristol" low-draw cowls and controllable air-outlet gills are employed.

The inner pair of installations embody "Bristol" engine-driven accessory gearboxes mounted on the bulkheads, providing drives for the two 1,000-watt electric generators, two vacuum pumps, and either a hydraulic pump or a low-pressure air-compressor to suit alternative types of "automatic pilot."

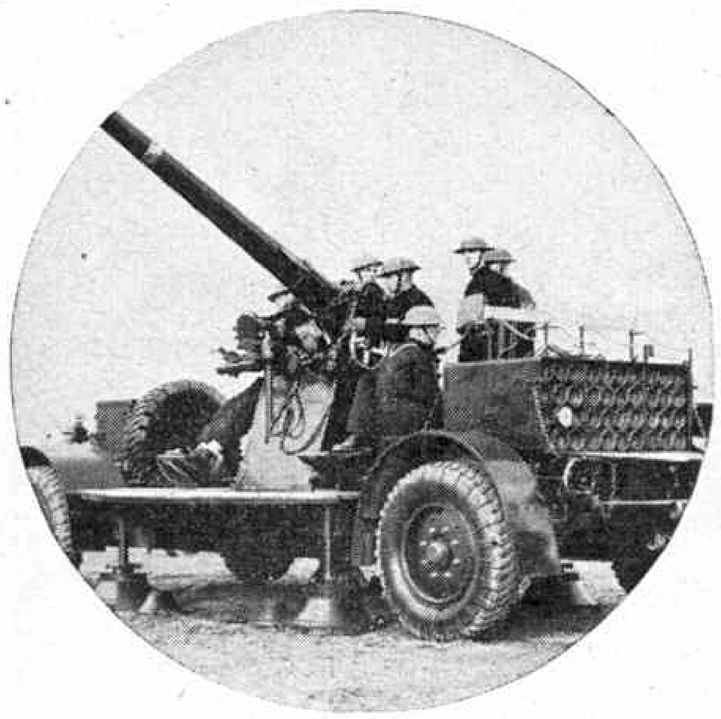
Each of these new flying boats is specially equipped for refuelling in flight, and it has been officially announced that after successful tests the Air Ministry and Imperial Airways have adopted this method for use in the transatlantic service. For the take-off at 46,000 lb. gross weight 1,500 gallons of fuel are carried. As soon as a reasonable height is reached, a "tanker" aircraft lowers a grapnel rope, which picks up a lead-weighted line already paid-out from the stern of the flying boat. This line is hauled in by the "tanker" and then relowered with the fuelling hose attached. The hose is hauled down by means of a winch in the flying boat, and makes contact with the special aperture in the stern. The connection is made petrol-tight by a hydraulic coupling. When 1,000 gallons of fuel have been transferred from the tanker, the latter withdraws the hose, and the flying boat, now weighing some 53,000 lb., proceeds on a non-stop flight of much longer duration than would otherwise have been possible with a given pay-load.

The Air Ministry have equipped three Handley Page "Harrow" bombers to act as tankers for the transatlantic operations.

For the information contained in this article we are indebted to "The 'Bristol' Review" and the Bristol Aeroplane Co. Ltd.



"Cabot" is fitted with four "Bristol" Perseus XIIc sleeve valve engines, and this illustration shows one of these units with the cowl removed and folding platforms in position for inspection purposes.



Britain's Mechanised Army in Meccano

Fine Models Built from New Outfit

THE use of mechanical transport to replace horse-drawn vehicles and columns of marching men, and the rapid development of tanks, anti-aircraft guns, and armoured vehicles, have revolutionised the Army of to-day. All boys are interested in the British Mechanised Units, and the new Meccano Mechanised Army Outfit announced on the inside front cover of this issue has been planned to enable them to build splendid models of tanks, guns and transport vehicles with a greater degree of realism than has been possible before. The specially designed parts in this Outfit are enamelled in Service green and black, and they are all interchangeable in the same manner as standard Meccano parts. This means that they can be assembled in different combinations to build up models of various types, several fine examples of which are illustrated on this and the facing page.

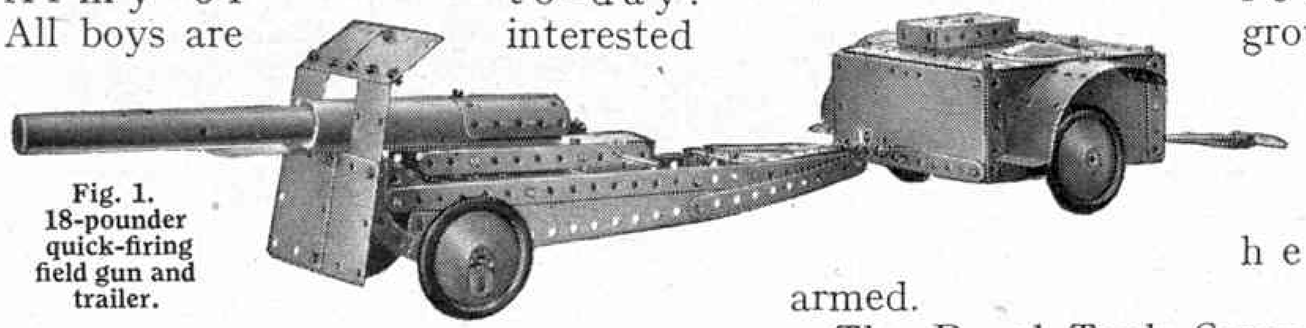


Fig. 1. 18-pounder quick-firing field gun and trailer.

One of the main items of equipment of a modern army is the tank, of which there are different types. The tank has been developed from the original idea of defending troops from machine-gun fire, and may almost be described as the modern counterpart of bullet-proof armour. It is capable of travelling over the roughest ground, and in its latest forms is very heavily armed.

The Royal Tank Corps has two types of tank, known as "Medium" and "Light." The present "Medium" weighs 12 tons and is fitted with a 90 h.p. 8-cylinder petrol engine, but the type is gradually being replaced by a "Cruiser" tank of nearly the same weight but of double the horse-power. The "Medium" carries a crew of five and is capable of a speed of 22 m.p.h. In front of its turret is a two-pounder quick-firing gun with a machine-gun beside it, and below and to the right of the latter is the driver's look-out manhole. A further machine-gun is placed on each side of the tank. In a vertical tube on top of the turret is housed a Morse signalling lamp. Most of the "Mediums" are fitted with wireless.

Remarkably realistic models of tanks can be built from the special parts contained in the Meccano Mechanised Army Outfit, and a good example of these is the "Light" Tank shown in Fig. 5. It is based on one of the latest "Light" units in the British Army, and reproduces closely all the main external features of the actual machine. The "Light" tanks weigh about 5 tons. They are fitted with a 25 h.p. petrol engine and can travel at speeds up to 40 m.p.h., while their gun equipment consists of one light and one heavy machine-gun. The model illustrated is complete with swivelling gun turret and creeper tracks, and as the parts from which it is built are enamelled in the Service green colour of the actual vehicle it has a truly lifelike appearance. One almost expects to see the crew come scrambling out of its interior! A finishing touch is given by



Fig. 2. Anti-aircraft gun.

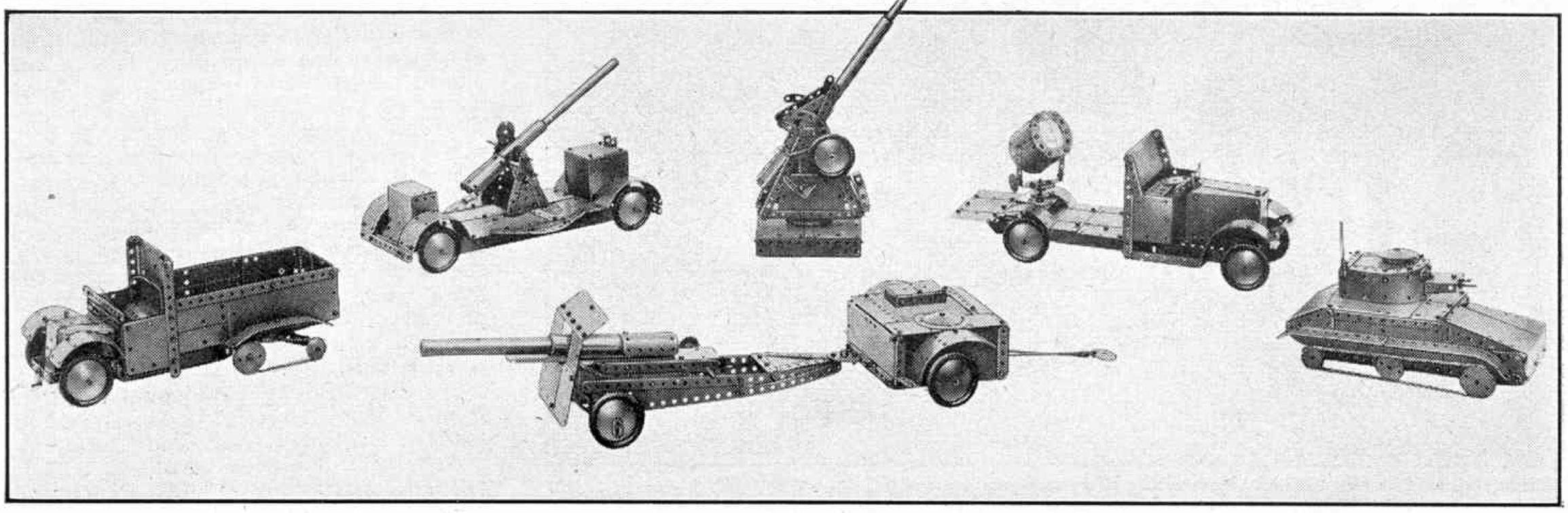
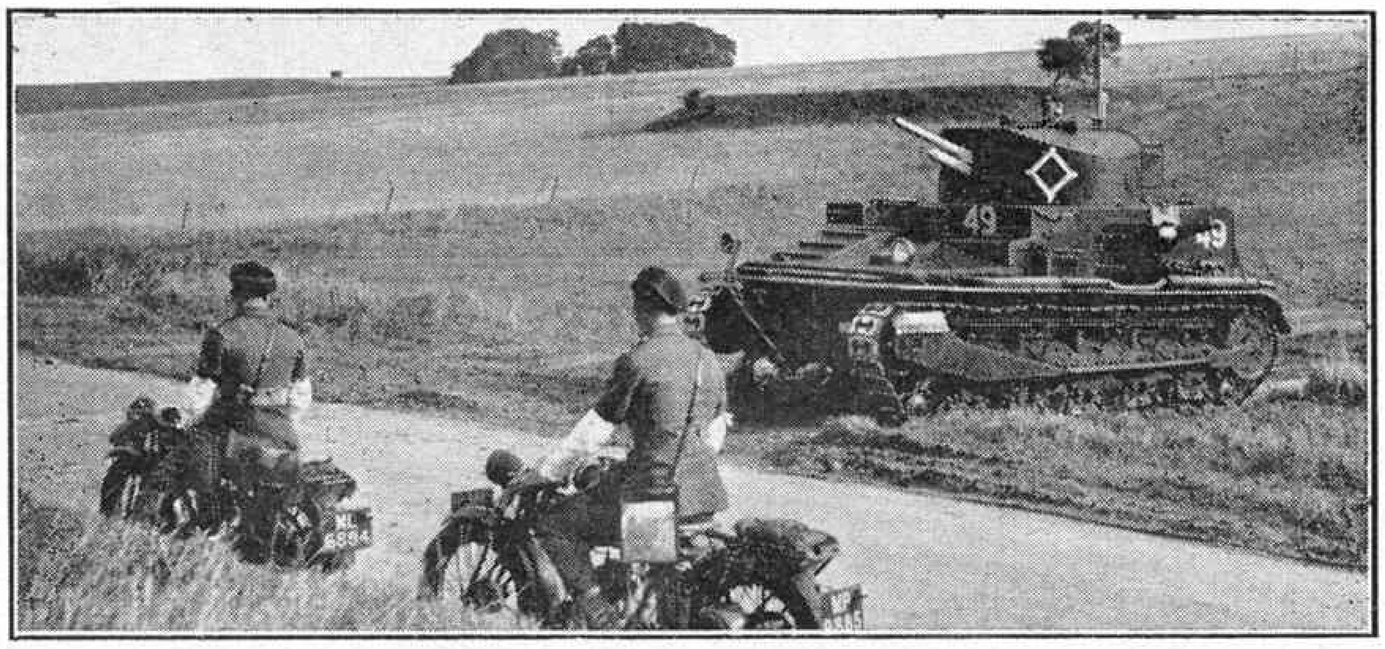


Fig. 3. A group of models built from Mechanised Army Outfit parts.



the noses of grim-looking machine-guns protruding from the front of the turret, the radio mast at the rear, and the look-out manholes on top.

The rapid development of long-range aircraft and the increasing efficiency of aerial bombs has necessitated the provision of adequate defence against air attack. The British Army has made great and rapid progress in this respect, and its equipment is now among the finest in the world. Special types of guns, both mobile and stationary, have been produced specially for anti-aircraft work. The mobile guns are mounted on travelling platforms, in such a manner that they have full range of movement and can be elevated and traversed with sufficient speed to follow the movement of the fastest bombing aircraft. The 3.7 in. anti-aircraft gun can fire twelve 28 lb. shells in one minute, and these shells take only eight seconds to reach a height of 10,000 ft.

The high speed of modern bombing planes makes it of vital importance to get the earliest possible warning of a coming attack. Human eyes and ears, unassisted, cannot be relied upon as aircraft detectors, and therefore scientific instruments of great sensitivity have been introduced for the purpose. These are designed on the principle of human hearing, namely, that when waves of sound reach a person he instinctively turns his head until they come with equal volume to each ear; he is then facing approximately the origin of the sound. The sound locator used in anti-aircraft units may be described as a sort of mechanical ear consisting of large movable trumpets. One man operates the trumpets for the horizontal plane and another those for the vertical; and a third man works out from the relative positions of the trumpets where the aeroplane is at any particular moment. This information is then passed to the searchlight crew, who direct the beam accordingly.

The height at which the aeroplane is flying is ascertained by a crew of three working a height finder, which might almost be described as a mechanical substitute for eyes. This information is passed to a team operating what is known as a predictor, which is one of the most marvellous instruments ever introduced for military purposes. It makes with surprising accuracy all the calculations that are required by the anti-aircraft gunners, and does this work with the greatest rapidity.

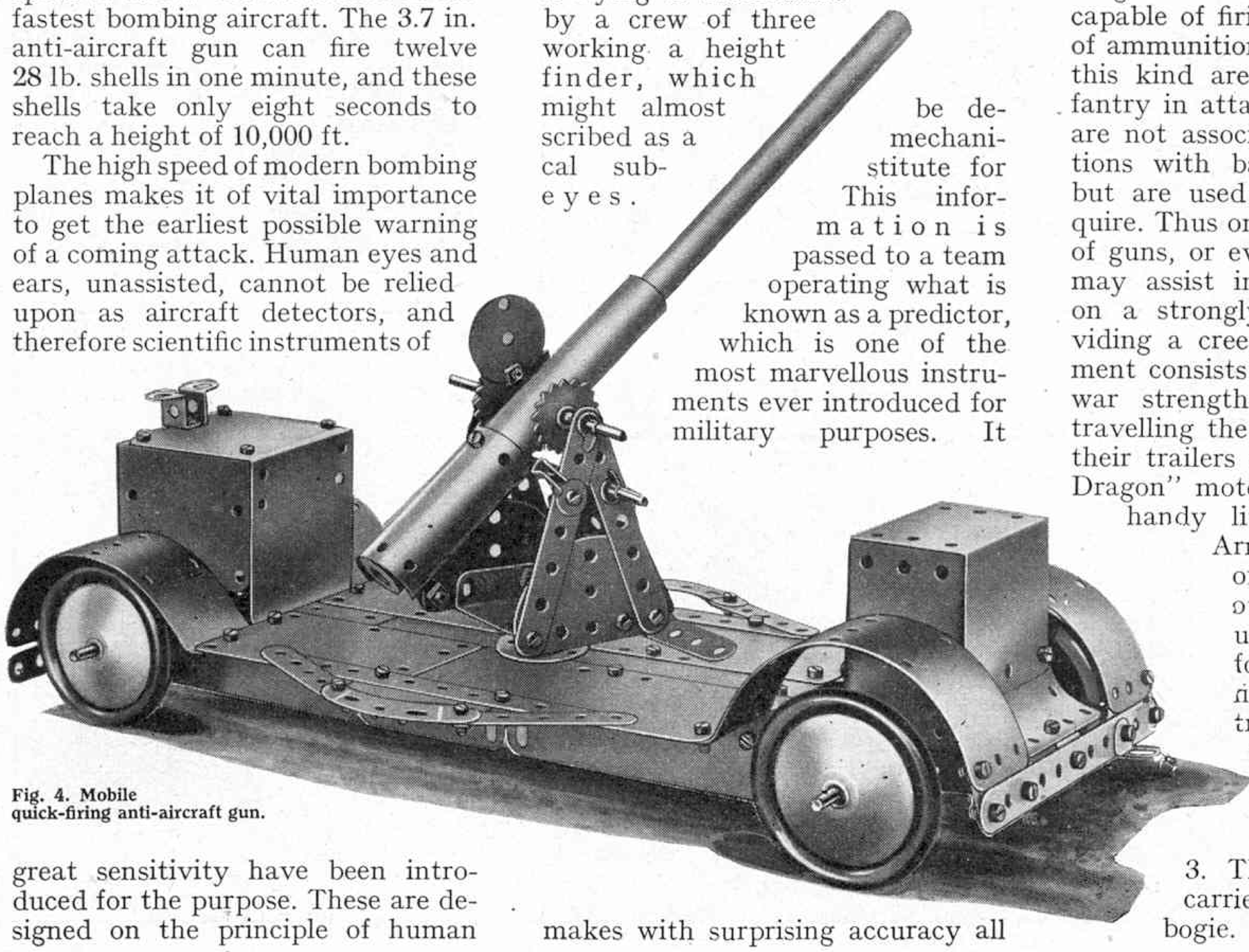


Fig. 4. Mobile quick-firing anti-aircraft gun.

Splendid models of anti-aircraft guns and searchlights are quite easy to build up from Mechanised Army Outfit parts. A good example of a mobile gun is shown in Fig. 4, while Fig. 2 illustrates a realistic model of a type of gun suitable for mounting on fixed sites, such as the tops of important buildings. A model of a lorry carrying a searchlight is shown in Fig. 3. The searchlight is pivotally mounted on the platform body and can be traversed and elevated in any direction.

Fig. 1 shows a reproduction of an 18-pounder quick-firing field gun and trailer, and is a very interesting model to construct. The 18-pounder guns of the British Army have an extreme range of about 8,000 yds., and are capable of firing up to nine rounds of ammunition per minute. Guns of this kind are used to support infantry in attack and defence. They are not associated in fixed proportions with battalions of infantry, but are used as circumstances require. Thus one, two or three troops of guns, or even a whole regiment, may assist infantry in an assault on a strongly held line, by providing a creeping barrage. A regiment consists of six troops, and its war strength is 24 guns. When travelling the 18-pounder guns and their trailers are hauled by "Light Dragon" motor tractors, which are handy little towing vehicles.

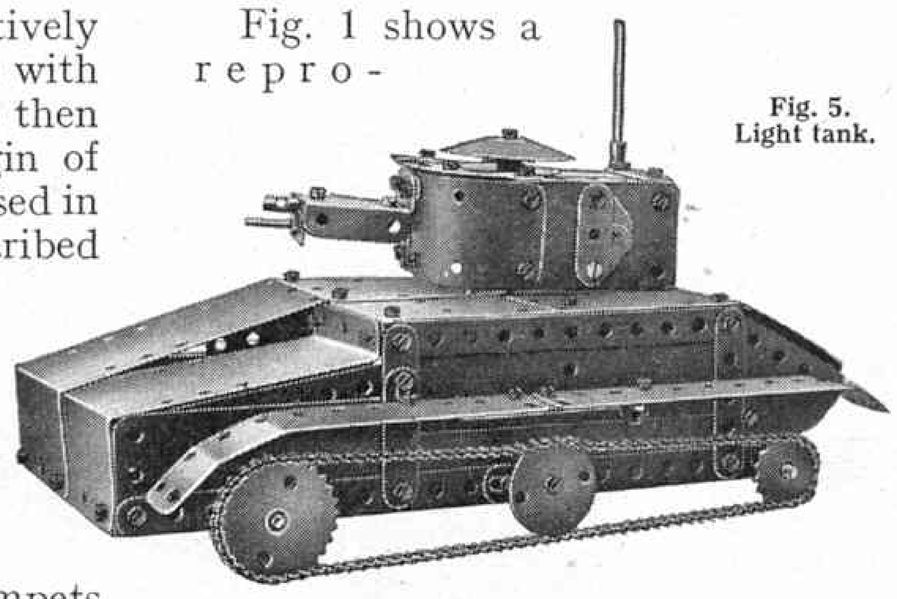


Fig. 5. Light tank.

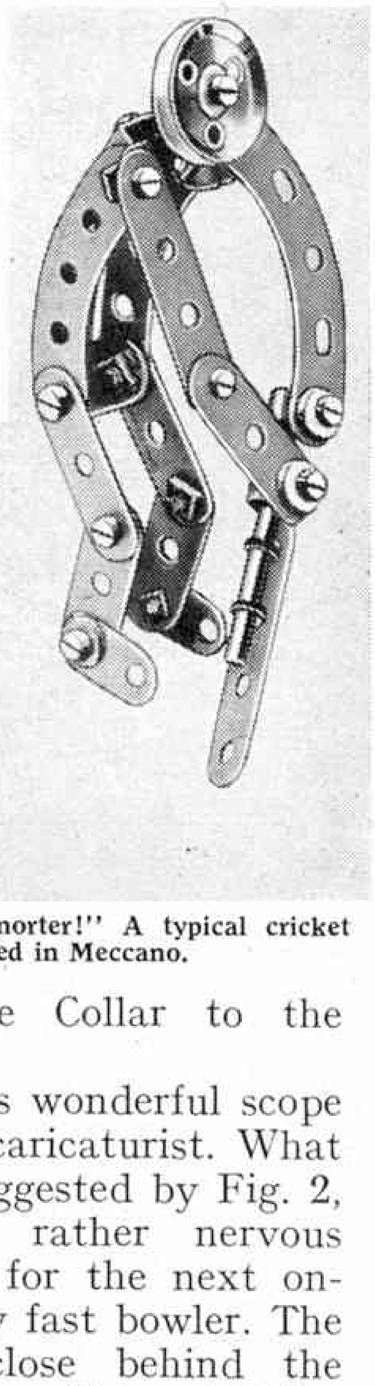
Army transport wagons often have to travel over very rough and uneven country, and for this reason are often fitted with creeper tracks instead of tyred wheels. A model of this kind built from Mechanised Army Outfit parts is shown in Fig. 3. The creeper tracks are carried on a pivoted rear bogie.

Sporting Meccano Models

Good Fun for Summer Model-building

ONE of the most jolly forms of Meccano model-building is the construction of simple figures depicting sportsmen in action, and the making of small models of this type is an ideal pastime for whiling away odd moments during the holiday period. The realistic models shown on this and the opposite page are typical examples, and they show that it is not necessary to use a large number of parts in order to obtain really fine results.

Every reader will be familiar with the various events that go to make up a school sports day programme, and the many exciting events such as sack races, obstacle races, hurdling, sprinting and jumping present a wide variety of exciting incidents, all of which can readily be reproduced in Meccano. For example Fig. 1 shows the start of a race and from the keen and businesslike appearance of the figures it looks like being a very exciting one! It is not so much the construction of the figures that "makes" models of this kind, but the realistic positioning of the limbs and bodies so as to obtain the characteristic pose. This is particularly noticeable in the posing of the three runners, and the attitude of the starter also lends realism to the scene. His slightly leaning stance suggests that in thought he is ready to join in the race himself, so thoroughly is he throwing himself into his task.



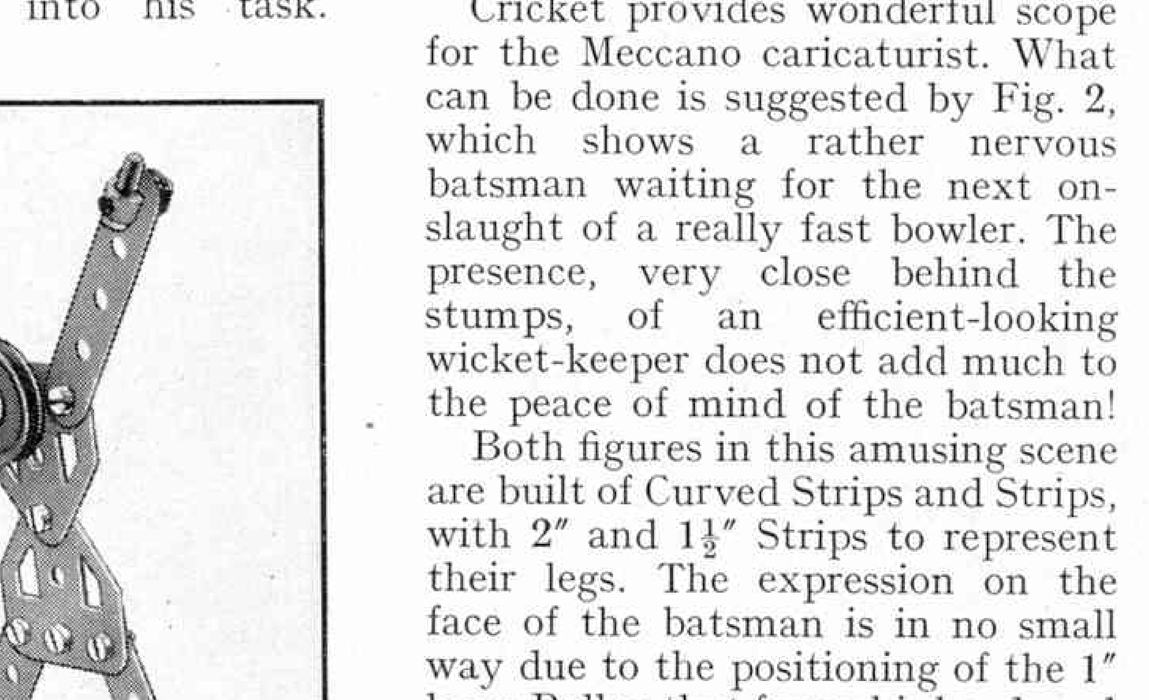


Fig. 2. Here comes a "snorter!" A typical cricket scene reproduced in Meccano.

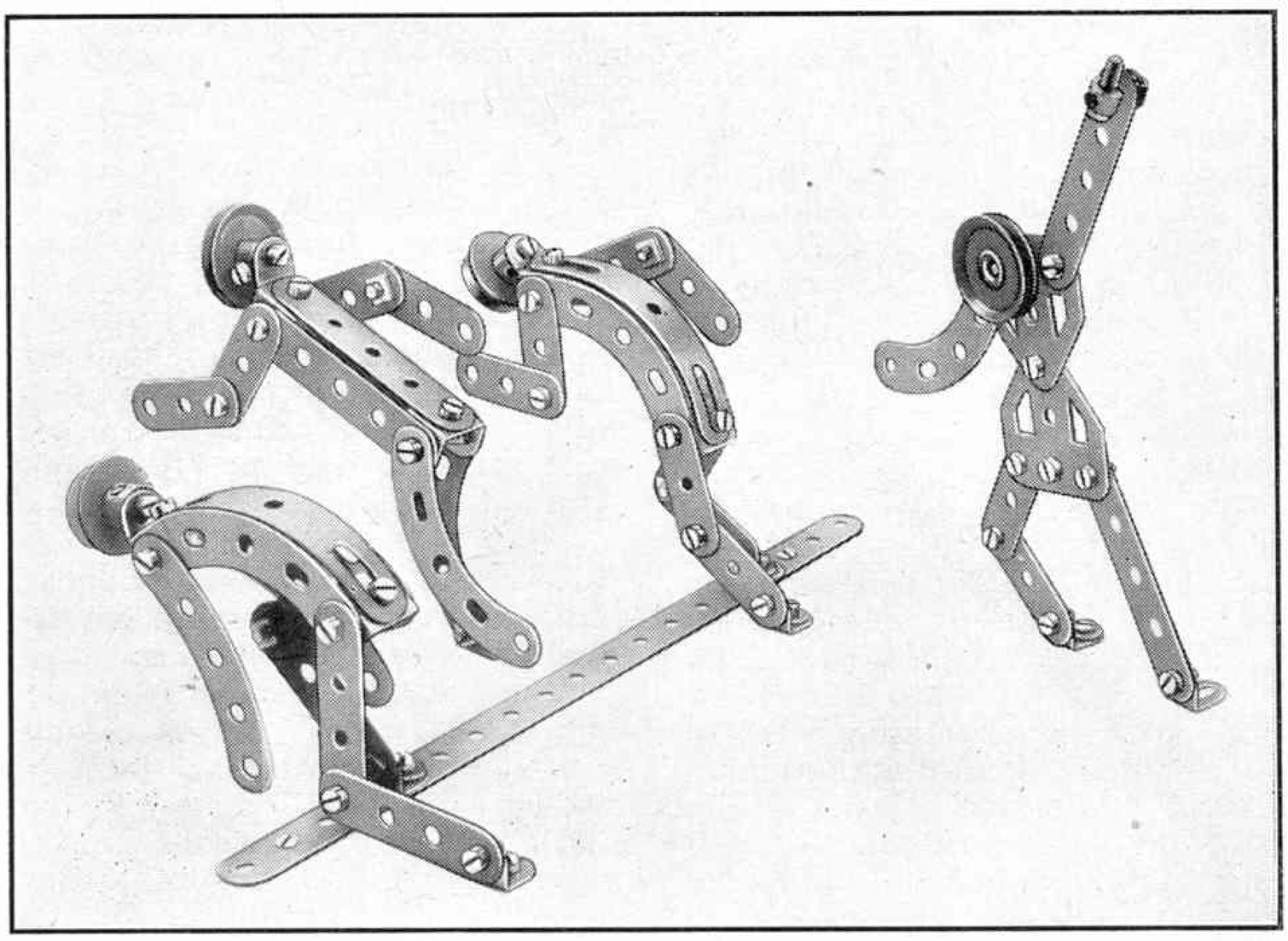


Fig. 1. "They're off!" Three Meccano sprinters get away to a good start.

Cricket provides wonderful scope for the Meccano caricaturist. What can be done is suggested by Fig. 2, which shows a rather nervous batsman waiting for the next onslaught of a really fast bowler. The presence, very close behind the stumps, of an efficient-looking wicket-keeper does not add much to the peace of mind of the batsman!

Both figures in this amusing scene are built of Curved Strips and Strips, with 2" and 1½" Strips to represent their legs. The expression on the face of the batsman is in no small way due to the positioning of the 1" loose Pulley that forms his head, and his rather apprehensive appearance is partly due to the use of a bolt head for his nose. The bat is a 2" Strip fixed to a 2" Rod by a Driving Band.

The figures are very simple to construct. The bodies of two of the runners are made from 2½" Curved Strips and Formed Slotted Strips, fixed together with Double Brackets, and the body of the third is made from 2½" Strips. Curved Strips and Strips form the arms and legs and are bolted in the required position. Heads are represented by 1" Pulleys and ¾" Flanged Wheels. The body of the starter is even easier to assemble. It consists of two Flat Trunnions and the limbs are Strips and Curved Strips. The gun is a ½" Bolt attached by an Aeroplane Collar to the upraised arm.

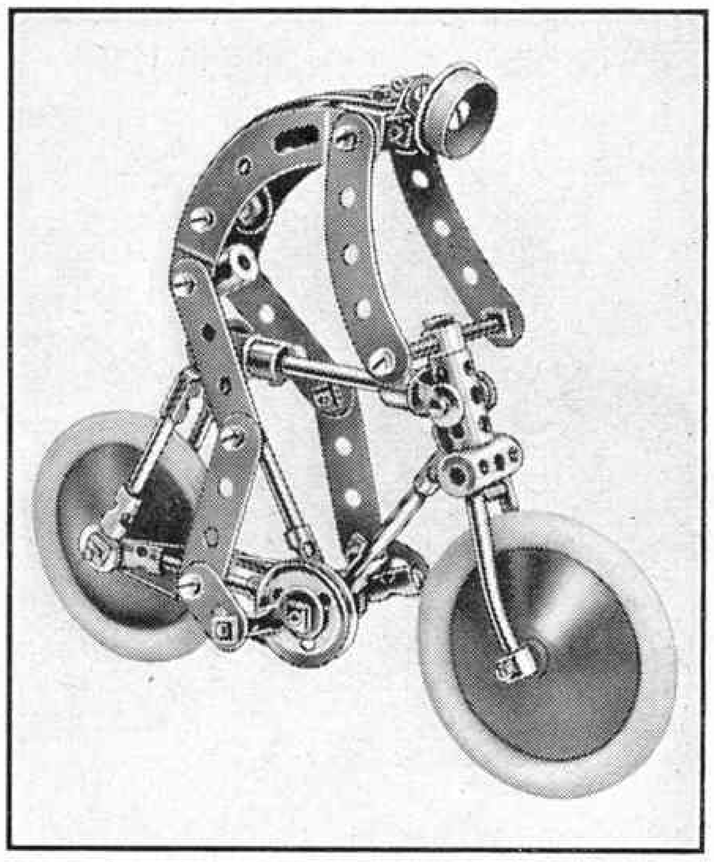


Fig. 3. A neat model of a cyclist. How it is constructed is described in this article.

Cycling also comes within the scope of model-building of this kind, and it is not at all difficult to assemble a simple model bicycle from a few Rods or Strips. Rods are of course more realistic, but Strips can be used by those who have only these parts available. The light-weight touring machine shown in Fig. 3 is quite easy to build and in its construction full use has been made of Rod and Strip Connectors. An interesting point is the construction of the cranks and pedals. The former are Rod and Strip Connectors and the latter are set screws, the heads of which are forced into the ends of the Rod and Strip Connectors so that the shanks are at right-angles to them. The feet of the

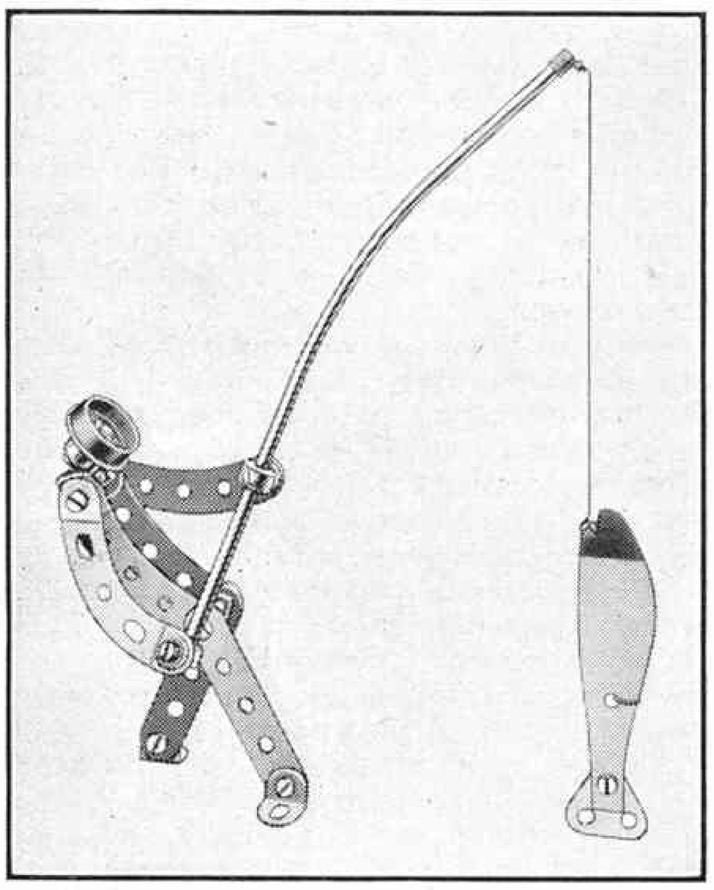


Fig. 4. "A 'whale' of a catch!" The Meccano angler's dream comes true.

rider are fixed on the shanks of the bolts by nuts. Tandems can be built up in a similar manner by extending the frame of the model shown in Fig. 3.

Another good idea is to fit a tandem with a small sidecar, an arrangement which is very popular. A small sidecar is easily made from a $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate and fixed to the side of the model tandem, and a 1" Pulley fitted with a Rubber Tyre makes an excellent wheel for it.

There will be few readers who have not seen an angler patiently waiting for a "bite," and the patience of the Meccano angler shown in Fig. 4 must have been prodigious, judging by the size of his catch! The "fish" is a Propeller Blade fitted with a Triangular Plate, and the fisherman appears to be having a difficult time landing it for his rod has already commenced to bend in the most alarming manner! The construction of this successful model angler follows closely that of the figures already described. The model-builder who tackles work of this kind indeed has only to build a series of figures and to alter their attitudes to make them perform many different kinds of actions, so that making up a new model is the work of only a few minutes.

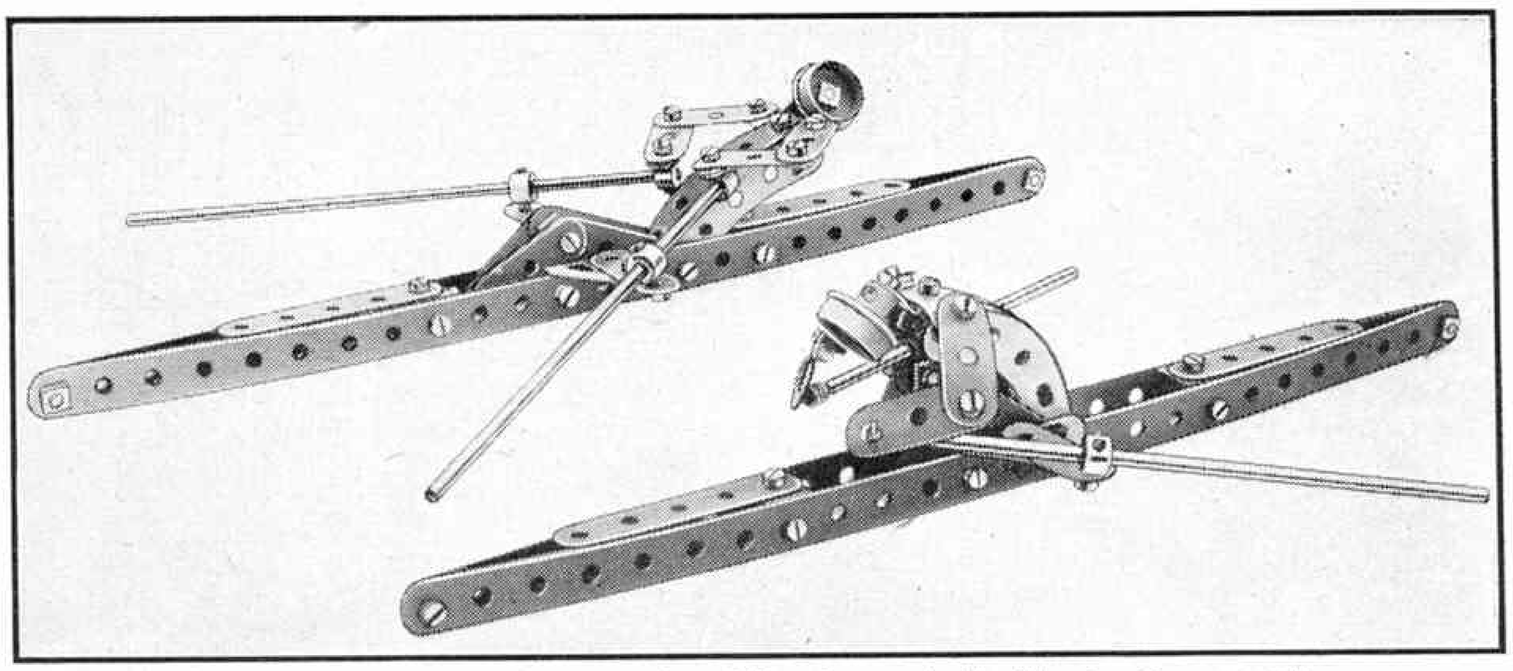


Fig. 5. Two ingenious models of racing skiffs and rowers built with a few Meccano parts.

Rowing is another fine sport that provides many subjects that are easily modelled with a few Meccano parts. One has only to watch the craft on a river to see the wide variety of boats and their rowers that can be modelled. The most fascinating of all subjects of this kind are the light racing skiffs that appear to glide effortlessly over the water, typical models of which are shown in Fig. 5. The appearance of the figures in the skiffs certainly suggests a hot race, for the occupant of the one lagging behind is bent over his oars ready for a strong pull. The leader, however, has an air of confidence about him as he finishes his stroke and glances over his shoulder to see if the path is clear.

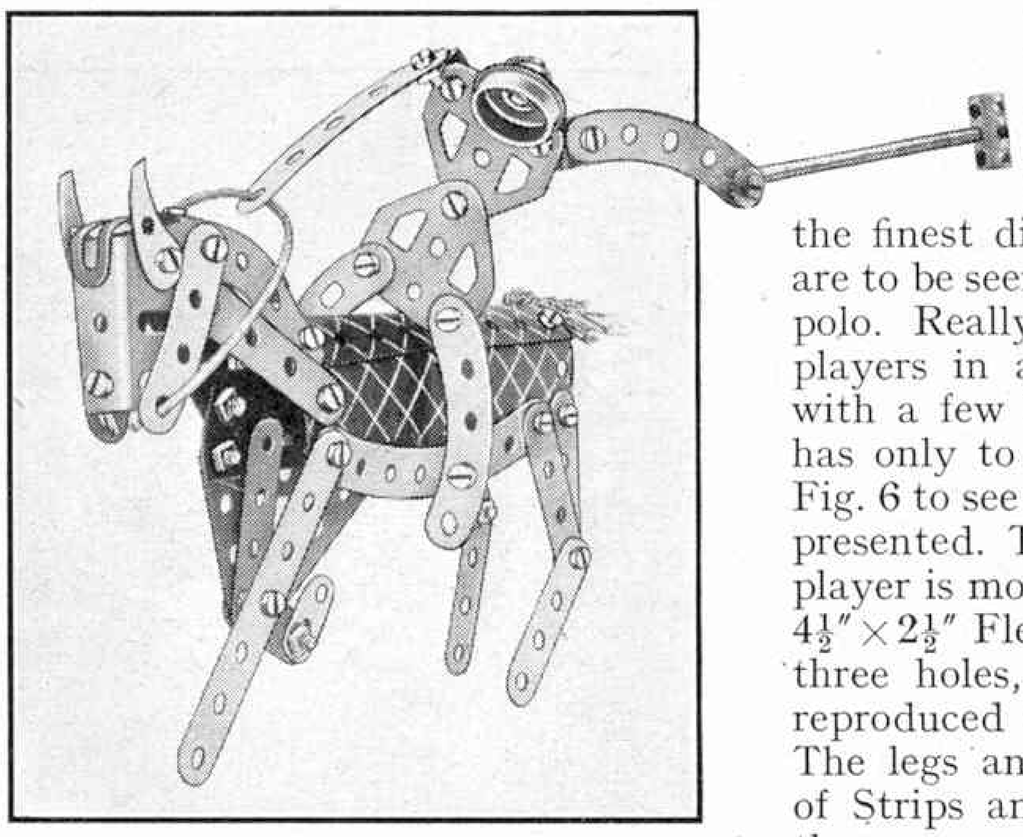
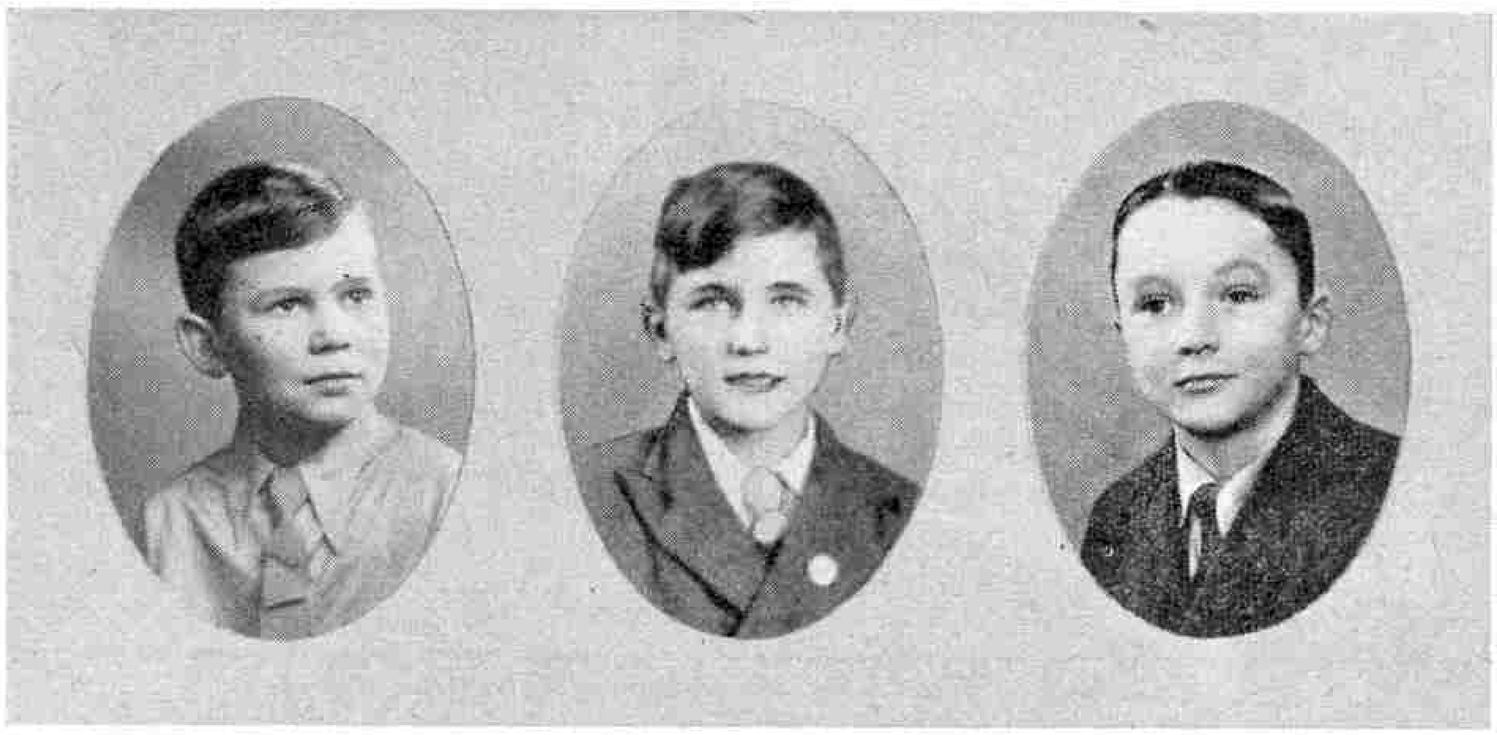


Fig. 6. A polo player in action. Skilful posing is the secret of success in model-building of this kind.

Only a few parts are needed for these simple models. The boat hulls are made from $12\frac{1}{2}''$ Strips spaced apart at the centre by Double Brackets. The outriggers that carry the rowlocks are $1\frac{1}{2}''$ Strips fixed to Trunnions. In assembling the figures care should be taken to get the right attitude of the bodies and limbs, otherwise the effectiveness of the model will be spoilt, and it is as well to study the various rowing positions beforehand. The attitudes of the figures shown in Fig. 5 are typical, especially the positions of the arms and legs. More amusing models can be arranged by taking the heavy pleasure rowing boats as subjects, for one can depict the antics of a novice at the oars in a really effective way. An incident that does not fail to raise a laugh is the sudden show of arms and legs when a boat inadvertently strikes an obstruction. The unfortunate occupants are thrown from their seats into the bottom of the boat!

Sports in which horses and men take part always provide the most fascinating action scenes that form excellent subjects for Meccano models, and the finest displays of horsemanship are to be seen in the exciting game of polo. Really lively scenes of polo players in action can be arranged with a few Meccano parts and one has only to glance at the model in Fig. 6 to see the possibilities that are presented. The horse on which the player is mounted is made from two $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates overlapped three holes, the curves being well reproduced with 4" Curved Strips. The legs and the head are formed of Strips and Curved Strips, while the ears are represented by Pawls without bosses. Smaller model horses of course can be made with U-Section Curved Plates if necessary. Examples of these are shown in the Instruction Manuals.



Happy prize-winners in the "Junior" Model-Building Contest. They are, from left to right, Brian Hamer, Middlesbrough; Norman Burns, Feltham; and Peter Dowell, Mancetter.

Model-Building Competition Results

By "Spanner"

Home and Overseas Prize-winners in the "Junior" Contest

The "Junior" Model-Building Competition was announced in the February issue of the *"M.M."* and was arranged specially for the benefit of young model-builders with only small Outfits. The models submitted naturally were simple, but many of them were remarkably neat and strongly-built.

Entries from both Home and Overseas readers were grouped in one section, and the competitors successful in winning prizes are as follows:

1st Prize, Meccano or Hornby products value £3/3/–: P. Dowell, Mancetter, nr. Atherstone; 2nd, products value £2/2/–: N. Burns, Feltham; 3rd, products value £1/1/–: L. Hindmarsh, Ourimbah, N.S.W., Australia.

Products value 10/6: A. Christmas, Ashford; B. Hamer, Middlesbrough; G. Richards, Mitcham; M. Turner, Barnes, S.W.13; R. Longshaw, London N.5.

Products value 5/–: J. Groombridge, London S.E.7; E. Russell, Loughborough; I. Appleby, London N.1; G. de Jong, Leiden, Holland; R. Threadgold, Liverpool 16.

A model of a fire-engine built with a No. 5 Outfit won First Prize for its builder, P. Dowell, Mancetter. The model owes its success mainly to its excellent proportions and the realism with which the various features of an actual engine are reproduced from the limited number of Meccano parts employed. The model is fitted with a telescopic ladder. The lower half of this consists of a 12½" Angle Girder, while the upper half is built from two 12½" Strips lengthened by 2½" Strips. The ladder is extended by turning a Crank Handle, which operates through a system of Pulleys. There is also a bell, a simple but important item of a fire-engine, and this is represented by a Pulley Wheel. A search-light formed by Pulley Wheels is mounted at the left-hand side of the windscreen. Curved Strips were put to good use in shaping the massive engine bonnet.

Dowell is only 11 years of age, and I hope his success in winning a First Prize so early in his model-building career will encourage him to submit entries for the open general competitions announced in the *"M.M."* from time to time.

A simple but realistic model of an early type of tramcar won Second Prize for N. Burns, Feltham, who is only eight years of age. Congratulations, Burns! I shall expect to find further entries from you in future competitions. The roof of the tramcar is built from a compound plate, and its ends are curved with 2½" Curved Strips to conform to the shape of the body. One of the most important features, the trolley pick-up, is represented in a very simple manner by a 3½" Crank Handle, which is held at the right angle by a piece of Cord. The model is built from Outfit No. 2.

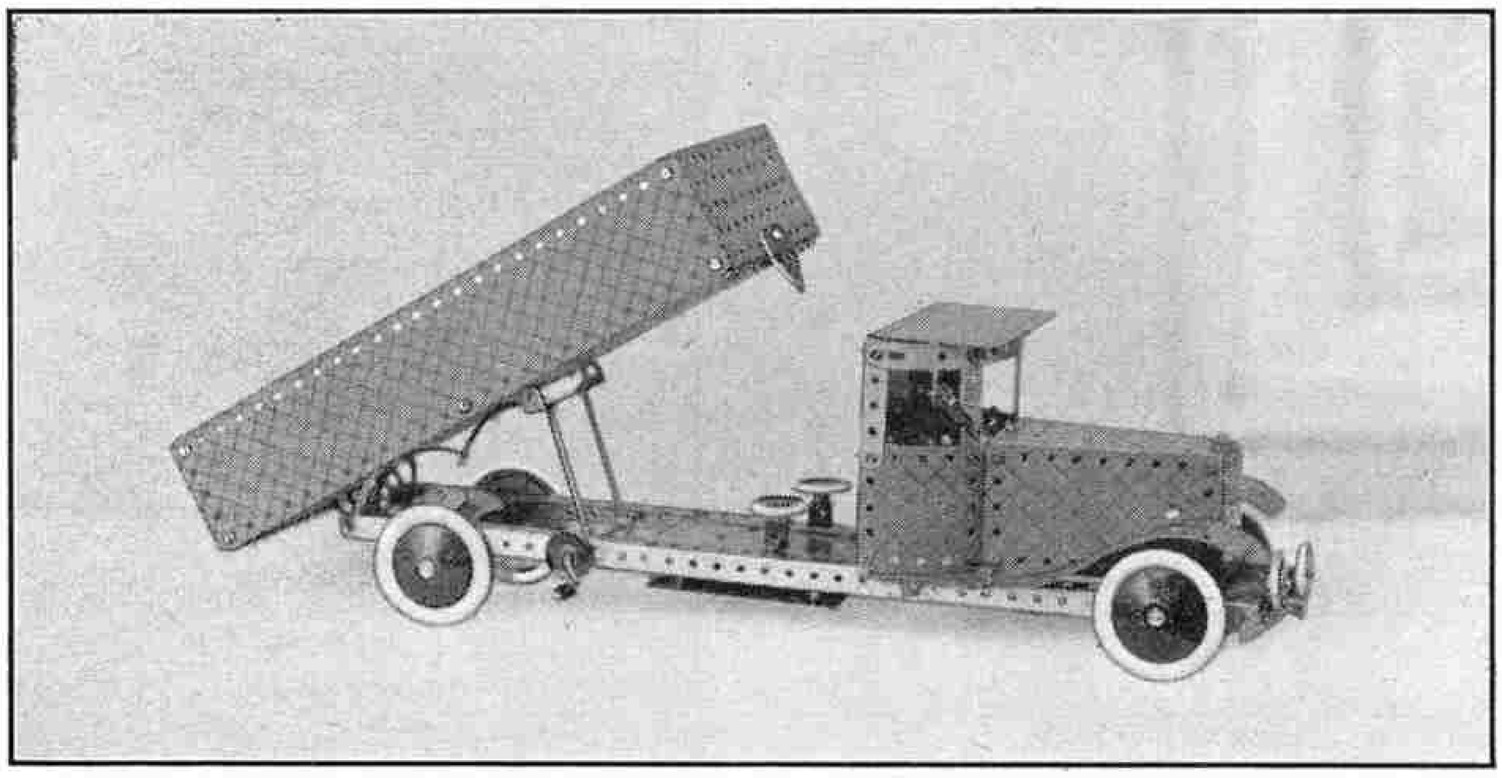
Third Prize was awarded to L. Hindmarsh, Ourimbah, Australia, for two interesting Outfit No. 5 models of log hauling vehicles known as "timber jinkers." One of the models represents a timber jinker used about 30 years ago, and consists of a long four-wheeled truck with a single shaft, to which, in the actual truck, were harnessed from 10 to 20 oxen. The other model represents a modern timber jinker, and in this case the oxen are replaced by a powerful motor hauling tractor. Models of a novel nature such as these always stand the best chances of success in *"M.M."* competitions, provided that they are well-built, and it is a pity that so many model-builders seem to overlook this important point.

A.Christmas, Ashford, submitted a model of a pit-head gear with twin cages that he built from the contents of Outfit No. 2. This is a really good example of the remarkable possibilities of a small Outfit, and is a credit to its builder. The two cages work in opposite directions so that each serves as a counterweight for the other, thus reducing the power required to operate them.

Many of the prize-winning entries were of a humorous type, and among these was one representing a photographer complete with camera, which was built from the contents of Outfit No. 6. It was sent by Martin Turner, Barnes, and shows one of the photographers usually to be seen at seaside resorts snapping holiday-makers and producing prints "while you wait." This subject provides plenty of scope for ingenious construction and Turner certainly made the best of his opportunity.

Another good model built from Outfit No. 6 was a streamlined racing car, the body of which was constructed entirely with Flexible and Strip Plates, bent skilfully to produce the required contours. This model won a prize for Brian Hamer, Middlesbrough.

One of the best working models entered in this competition is the tipping motor lorry shown on this page. It was built by G. Richards, Mitcham, and is driven by a No. 1 Clockwork Motor.



G. Richards, Mitcham, won a prize in the "Junior" Model-Building Competition for this simple and well-built model tipping lorry.

Special Summer Competitions for Meccano Enthusiasts

Final "Puzzle Picture" Contest

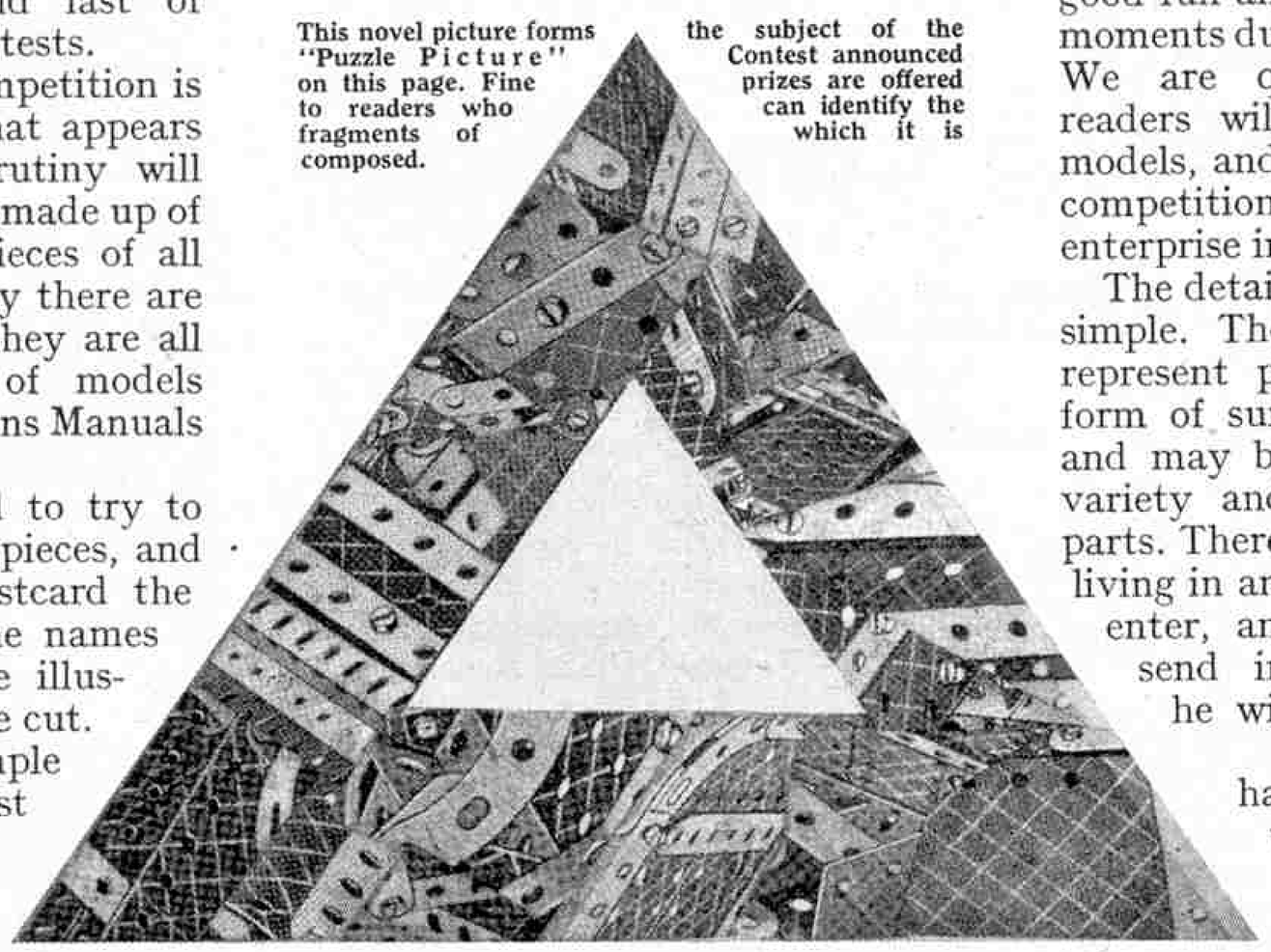
The "Puzzle Picture" Competitions announced in the June and July issues of the Magazine proved very popular and readers all over the world have written to say how much they enjoyed the fun of trying to solve them. This month we announce the third and last of these special summer contests.

The subject of this competition is the triangular picture that appears on this page. Close scrutiny will reveal that this picture is made up of a number of separate pieces of all shapes and sizes. Actually there are 20 of these pieces, and they are all cut from illustrations of models in the Meccano Instructions Manuals for Outfits Nos. 0-6.

Competitors are asked to try to recognise each of the 20 pieces, and to write down on a postcard the Manual numbers and the names of the models from the illustrations of which they are cut. This is a much more simple task than it may at first appear, and a careful examination of the illustrations in the Manuals and that on this page will soon result in many of the pieces being identified.

Competitors are warned that the pieces are not necessarily printed in the same angular positions in the illustration on this page as they occupy in the Manuals; some of them may even be upside down! Those who cannot identify all the fragments should not hesitate to send in their entries. Even if they cannot give the names and Manual numbers of every model represented, they may easily obtain one of the prizes offered, for if no competitor succeeds in identifying all the pieces in the illustration, the awards will be made to the readers who send in the best attempts. If more than one competitor names every fragment correctly, however, the prizes will be given to those whose entries are the most neatly and clearly prepared, and the decision of the judges must be accepted as final.

The Contest is open to readers living in any part of the world, and there is no age limit. Each competitor is allowed one attempt only. The chief prizes to be awarded are as follows: First, Meccano or Hornby products value £3/3/–; Second: products value £2/2/–; Third: products value £1/1/–. There also will be five consolation prizes of Meccano or Hornby Train products to the value of 5/– each.



This novel picture forms the subject of the Contest announced on this page. Fine prizes are offered to readers who can identify the fragments of which it is composed.

The closing date for receipt of entries is 31st October. These must be by postcard only, and should be addressed *"Sharp Eyes Contest No. 3,"* Meccano Ltd., Binns Road, Liverpool 13. Prize-winners will be notified by letter as soon as possible after the closing date and they will be allowed choice of any products, to the value of their prizes, that are shown in current Meccano and Hornby catalogues. Competitors should take care to see that their entries bear their name and full address.

Solving these puzzle pictures will be found a remarkably fascinating pastime, and we strongly advise all readers who have not taken part in previous competitions of this kind to hurry up and enter the present contest. It is really good fun searching in the Manuals for the tiny fragments, and there is always the chance of winning a valuable prize.

"Meccano Sportsmen" Competition

On pages 486 and 487 of this issue appear descriptions and illustrations of novel Meccano models showing people engaged in various summer sports and games, such as running, cycling, cricket and rowing. Building simple models of this kind is really good fun and a fine pastime for odd moments during the holiday months. We are quite sure that many readers will enjoy designing such models, and are organising a special competition in order to encourage enterprise in this direction.

The details of this competition are simple. The models entered must represent people engaged in some form of summer sport or pastime, and may be constructed with any variety and quantity of Meccano parts. There is no age limit. Readers living in any part of the world may enter, and any competitor may send in as many entries as he wishes.

The models that will have the best chances of winning prizes will be those in which the figures are most life-like, and which are not simply an assembly of Meccano parts chosen with little regard to the purpose for which they are used. When a model is completed it should be photographed, or, if this is not possible, a good drawing of it should be made. The photograph or drawing should then be sent to *"Meccano Sportsmen Competition,"* Meccano Ltd., Binns Road, Liverpool 13.

Entries will be divided into two sections. A, for competitors of all ages living in the British Isles; B, for competitors of all ages living Overseas. Section A will close for entries on 31st August, but Section B will remain open until 31st October.

A fine range of prizes will be awarded for the most realistic and skilfully-built models received in each section, and the chief of these are as follows: First Prize, Meccano or Hornby products value £2/2/–. Second, products value £1/1/–. Third, products value 10/6. There will be also five prizes value 5/–.

New Meccano Models

Fine Subjects for Small Outfits

ONE of the four new models described this month is a simple hand-operated hoist with which small loads can be raised. This is shown in Fig. 1 and it can be built with Outfit No. 1. Another small model that will appeal to the younger boys is the man pushing a handcart shown in Fig. 3. This is driven by a *Magic* Motor and is constructed from the parts in Outfit No. 2. There are also a fine working model of an agricultural tractor and trailer and a realistic steam trawler, which are built from Outfits Nos. 4 and 5 respectively. These are illustrated in Figs. 2 and 4.

Construction of the model hand-operated hoist is commenced by fixing two Trunnions to a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate in the manner shown in Fig. 1. Two $5\frac{1}{2}''$ Strips are then bolted in a vertical position to the Trunnions to form bearings for the axle 1, which is a $3\frac{1}{2}''$ Rod. Two 1″ fast Pulleys 3 are placed face to face on Rod 1 between the $5\frac{1}{2}''$ Strips, the Rod being kept in its bearings by a third 1″ Pulley at one end and a Bush Wheel 2 at the other end. Four $\frac{3}{8}''$ Bolts are then lock-nutted in holes in the Bush Wheel 2 as shown. A frame to carry a 1″ Pulley 4 is built up by attaching three Angle Brackets to each of two Flat Trunnions to form the sides, which are then joined together by bolts through the Angle Brackets as shown. The Pulley 4 is mounted on a 2″ Rod journalled in the Flat Trunnions, and is retained in position on the Rod by Spring Clips.

The pulley block is suspended by winding one end of the length of Cord around the Rod 1 and then leading it around the Pulley 4. The Cord is then wound in the opposite direction around the two Pulleys 3, to which it is finally anchored. Loads attached to the hook may be raised by pulling on an endless length of Cord, wound around the Bolts in the Bush Wheel 12.

Parts required to build the model hand-operated hoist: 2 of No. 2; 2 of No. 10; 6 of No. 12; 4 of No. 22; 1 of No. 24; 2 of No. 35; 25 of No. 37a; 17 of No. 37b; 4 of No. 38; 1 of No. 40; 1 of No. 52; 4 of No. 111c; 2 of No. 126; 2 of No. 126a.

The model of a man pushing a handcart illustrated in Fig. 3 is driven by a *Magic* Motor concealed under the bottom of the handcart, and when this is set in motion the model travels along the ground at a good speed.

The model is an easy one to build and it is best to commence with the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate that serves as the base of the cart and attaching to its flanges $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates to form the sides. The upper and lower edges of the Flexible Plates are strengthened by $5\frac{1}{2}''$ Strips as shown in Fig. 3. The front of the cart is a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate bolted at its lower edge to the Flanged Plate and attached to the sides of the cart by two Angle Brackets. A $2\frac{1}{2}''$ Strip strengthens its upper edge. The shafts are $2\frac{1}{2}''$ Strips. A $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip is next bolted between the flanges

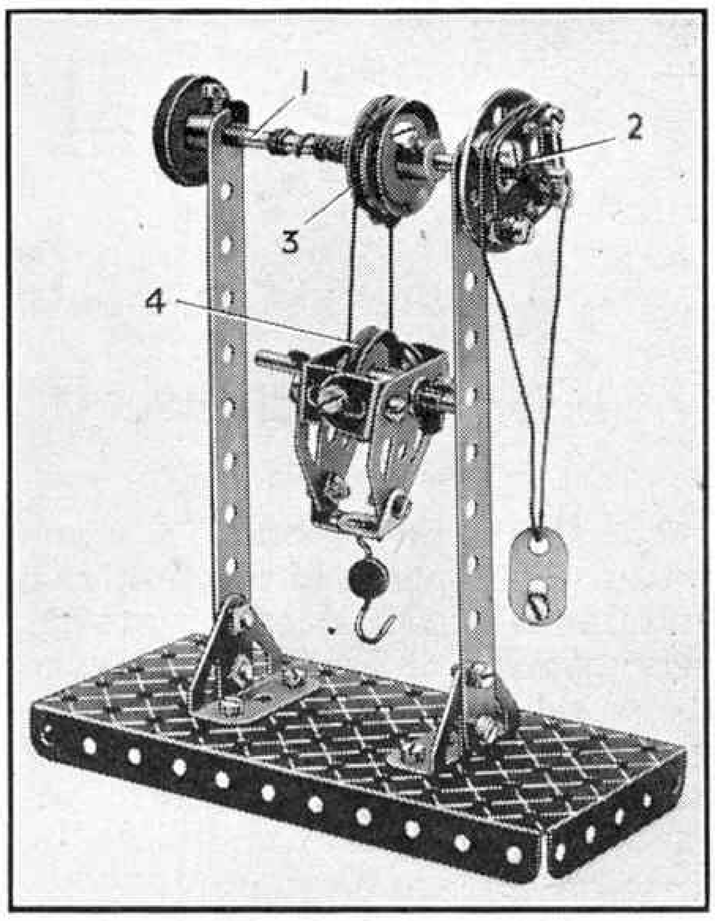


Fig. 1. A simple hoist that will lift small loads. It is built from the parts in Outfit No. 1.

of the Flanged Plate and to it are fixed two Trunnions. These form bearings for the $3\frac{1}{2}''$ Rod 1, which carries a $\frac{1}{2}''$ fast Pulley at its centre and a 1″ Pulley fitted with a Rubber Ring at each end. At this stage the *Magic* Motor is bolted underneath the Flanged Plate at the front of the handcart, and the pulley on its driving shaft is connected to the 1″ fast Pulley on Rod 1 by a Driving Band of suitable length.

The body of the man is built up from two Flat Trunnions. The head is represented by a 1″ Pulley attached to the Flat Trunnions by means of a Flat Bracket, and legs are formed with $2\frac{1}{2}''$ Strips, which are attached to the body by Angle Brackets.

Parts required to make model of man pushing handcart: 4 of No. 2; 5 of No. 5; 1 of No. 10; 4 of No. 12; 1 of No. 16; 1 of No. 17; 4 of No. 22; 2 of No. 35; 32 of No. 37a; 32 of No. 37b; 2 of No. 48a; 1 of No. 52; 2 of No. 90a; 1 of No. 111c; 2 of No. 126; 2 of No. 126a; 2 of No. 155a; 1 of No. 188; 2 of No. 189; 1 *Magic* Motor (not included in Outfit).

The fine model of an agricultural tractor and trailer shown in Fig. 2 is based on those used on large farms, and in the illustration the trailer is shown loaded with Meccano Miniature Loaded Sacks.

The chassis of the tractor is a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate extended 1 in. to the rear by a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate. A $5\frac{1}{2}''$ Strip is bolted to each flange of the Plate, the free ends of the Strips being fixed to a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip bolted to the Flexible Plate. The No. 1 Clockwork Motor that forms the power unit is now attached to the chassis by means of two Angle Brackets. The radiator is formed from a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate that is overlapped two holes by a

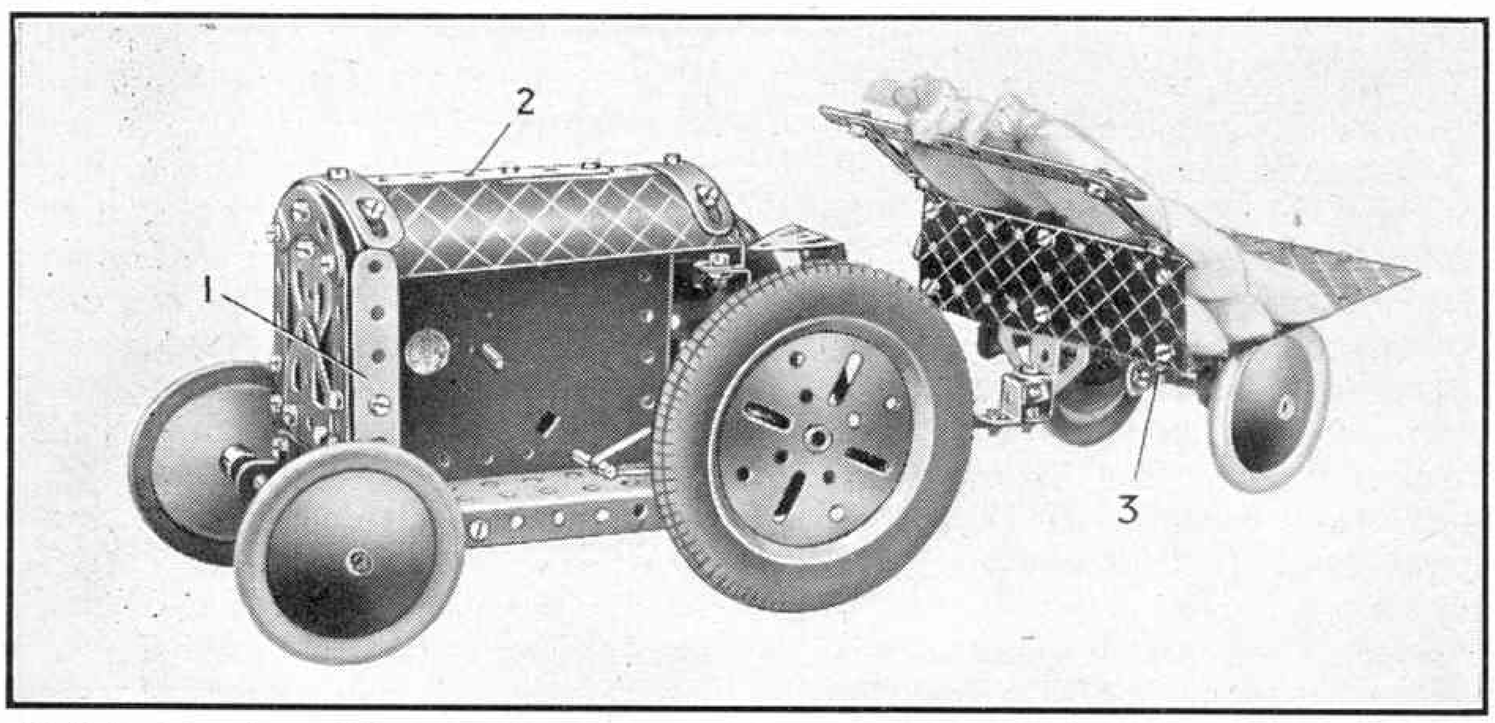


Fig. 2. An interesting and "not too difficult" model of an agricultural tractor and trailer built from Outfit No. 4.

$2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate. The compound plate thus formed is edged round with $2\frac{1}{2}''$ Strips and a $2\frac{1}{2}''$ Curved Strip, and the grill is represented by two Flat Trunnions bolted in the positions shown. The compound strips 1, each consisting of two $2\frac{1}{2}''$ Strips overlapped three holes, are bolted to the flange of the $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate and serve to attach the radiator to the chassis.

The bonnet is built up of two $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates bolted together by their long edges and curved to the shape shown. The front end of the bonnet is fixed to the radiator by an Angle Bracket, and at the rear is attached to a $2\frac{1}{2}''$ Curved Strip that is connected to two $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips bolted to the chassis. A third Double Angle Strip bolted to the first pair provides bearings for the rear axle, which is a 4″ Rod. The 1″ Pulley is driven direct from the driving spindle of the Clockwork Motor through a $2\frac{1}{2}''$ Driving Band.

To complete the tractor a $5\frac{1}{2}''$ Strip and a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip are attached by the same bolt to the Flexible Plate of the chassis. The former represents the draw-bar of an actual tractor and carries at its outer end a Reversed Angle Bracket, while the latter is the seat pillar and is fitted with a Trunnion for a seat.

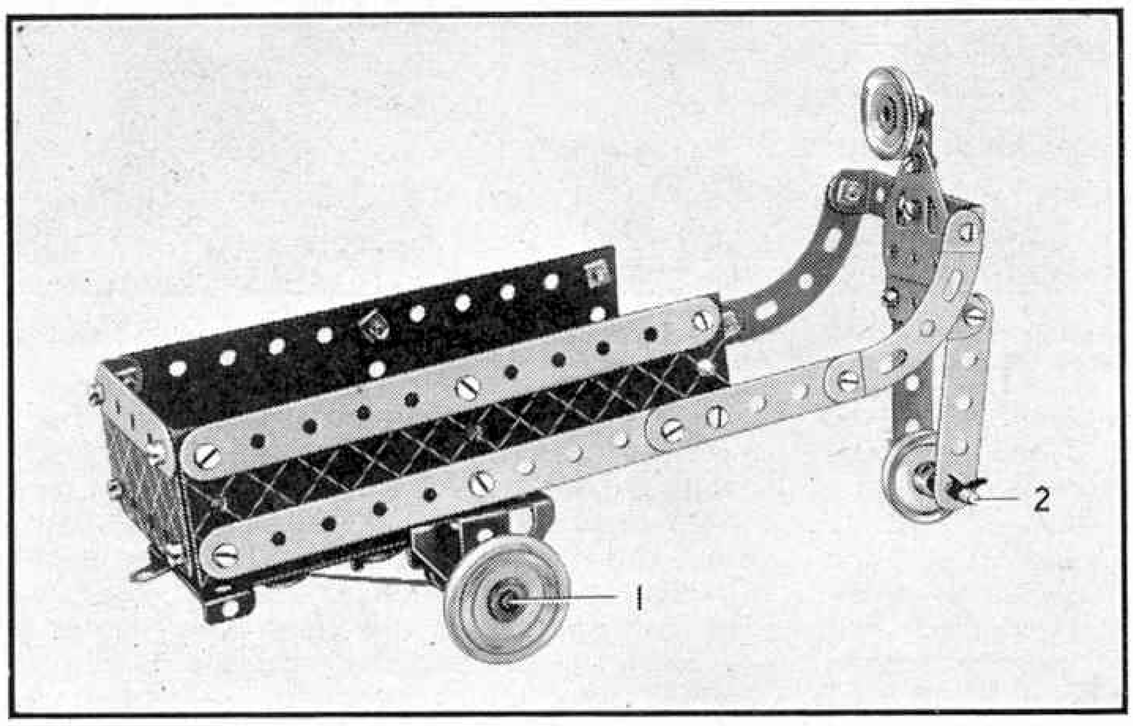


Fig. 3. This jolly model of a man pushing a handcart is fitted with a Magic Motor, which drives it along the ground.

The trailer platform comprises two $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates, which are stiffened by attaching two $5\frac{1}{2}''$ Strips 3 to them by Angle Brackets. Two $2\frac{1}{2}''$ Curved Strips are then attached to the $5\frac{1}{2}''$ Strip by Flat Brackets, and their centre holes provide bearings for a $3\frac{1}{2}''$ Rod, which carries at each end a Road Wheel.

Parts required to build the model tractor and trailer: 8 of No. 2; 2 of No. 3; 9 of No. 5; 4 of No. 10; 1 of No. 11; 8 of No. 12; 2 of No. 12c; 2 of No. 15b; 1 of No. 16; 2 of No. 19b; 1 of No. 22; 4 of No. 35; 81 of No. 37a; 75 of No. 37b; 2 of No. 38; 1 of No. 48; 6 of No. 48a; 1 of No. 51; 1 of No. 52; 4 of No. 90a; 1 of No. 125; 2 of No. 126; 2 of No. 126a; 2 of No. 142b (not included in Outfit); 1 of No. 186; 4 of No. 187; 2 of No. 188; 2 of No. 190; 2 of No. 191; 2 of No. 192; 2 of No. 215. 1 No. 1 Clockwork Motor (not included in Outfit).

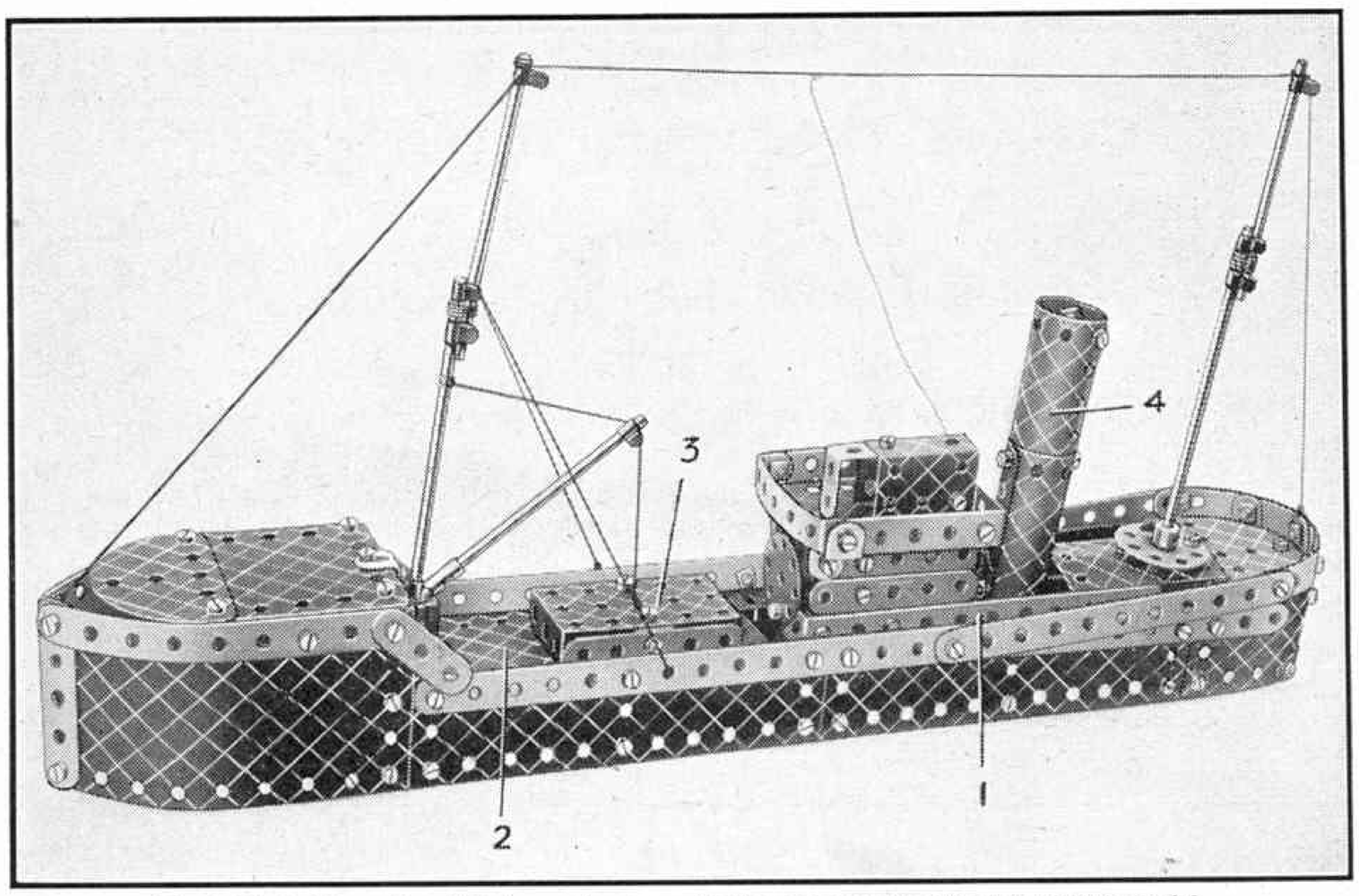


Fig. 4. Most of the external features of a steam trawler are reproduced in this realistic model.

The remaining model to be described is the steam trawler illustrated in Fig. 4, which is based on the vessels employed in the fishing fleets off the west coast of Scotland and in North Atlantic waters.

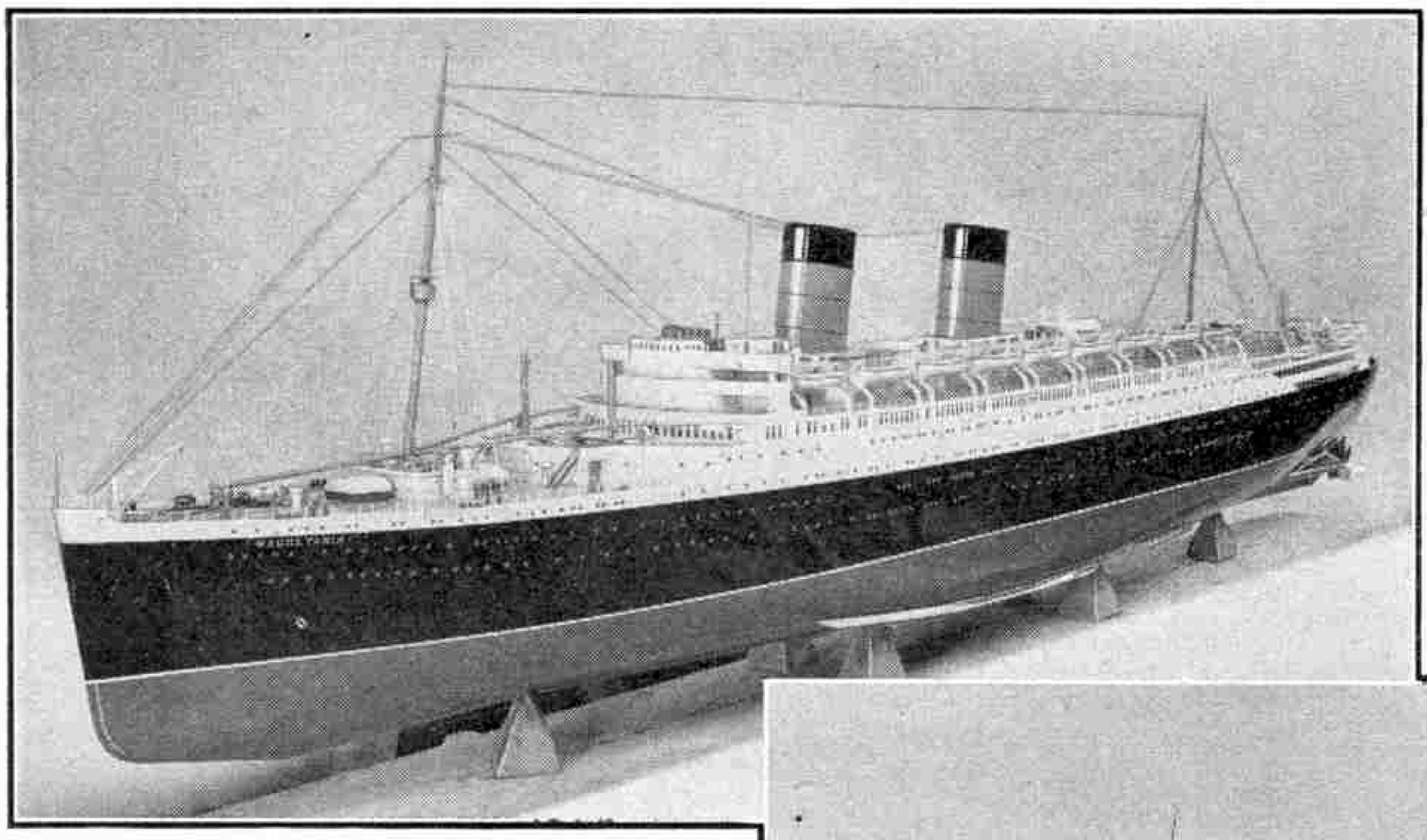
Each side of the hull consists of two $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates, the upper edges of which are clamped between a $12\frac{1}{2}''$ Strip and a $12\frac{1}{2}''$ Angle Girder, while their lower edges are stiffened by $12\frac{1}{2}''$ Strips bolted to them. The bows are built up from two $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates strengthened along their upper edges by $2\frac{1}{2}''$ and $3\frac{1}{2}''$ Strips. The Plates are connected together at the bows by Angle Brackets, the bolts by which these are attached holding also $2\frac{1}{2}''$ Strips.

Three $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates comprise the stern, which is railed round with two $5\frac{1}{2}''$ Strips and two Formed Slotted Strips, the latter parts being attached to the Plates by Flat Brackets.

The deck is formed by a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate and a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate 2. These are bolted to the $12\frac{1}{2}''$ Angle Girders so that there is a space of $\frac{1}{2}$ in. between them. The hatch 3 is a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate to which $2\frac{1}{2}''$ Strips are attached by Reversed Angle Brackets. The latter serve also to fix the hatch to the deck. The sides of the deckhouse consist of $5\frac{1}{2}''$ Strips 1 connected at their forward ends by a $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip and at their rear ends by a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate, which is bent with a $\frac{1}{2}$ in. flange at each side. The Strips 1 overlap the Plate three holes. The end of the Flexible Plate is closed by Angle Brackets and a Trunnion. Flat Trunnions are fixed to the front ends of the $5\frac{1}{2}''$ Strips 1, and to them are bolted $2\frac{1}{2}''$ Strips and $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips.

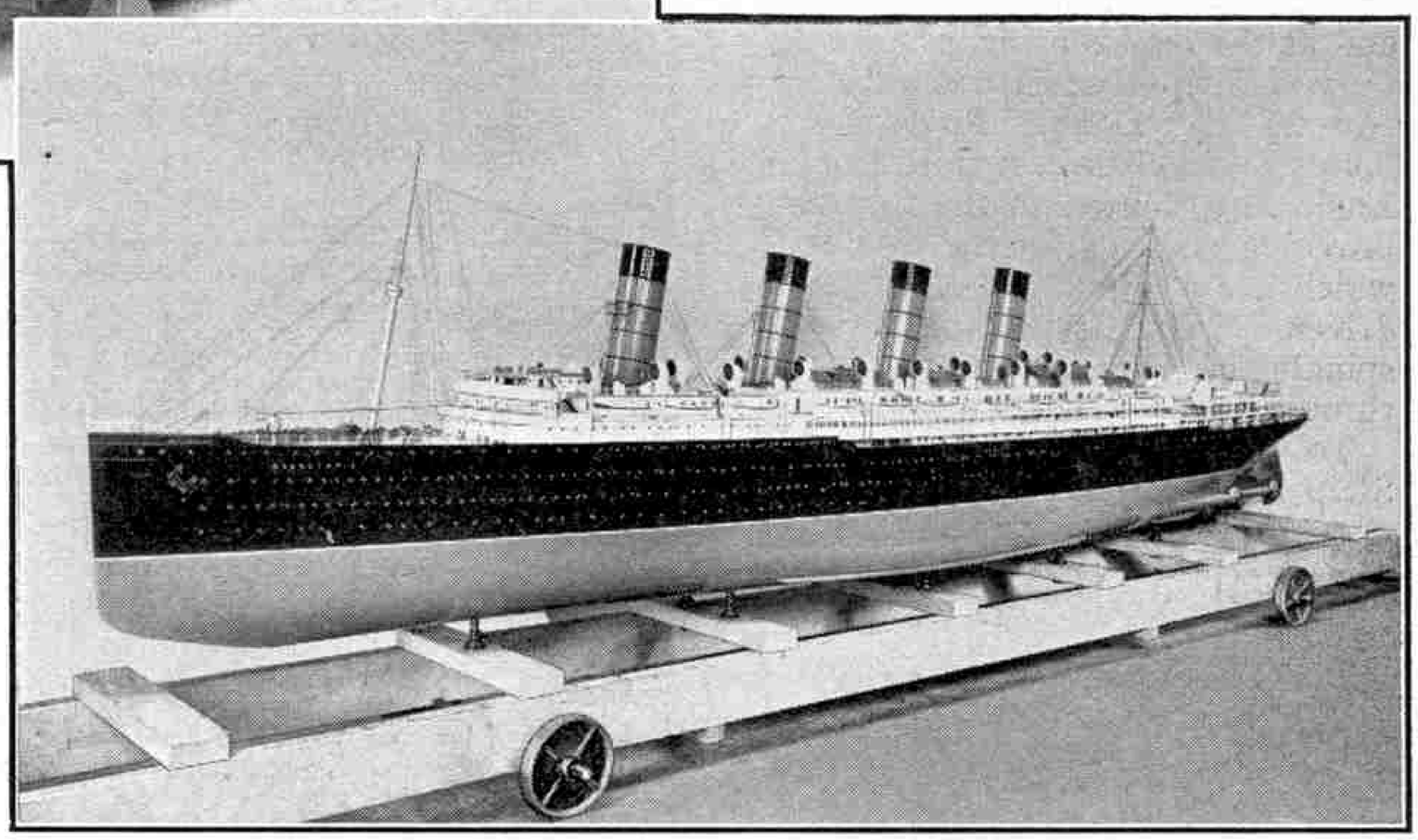
The bridge comprises a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate edged round with $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips and $2\frac{1}{2}''$ Strips, and it is connected to the deckhouse by Reversed Angle Brackets. The wheelhouse is a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate bent to U-section, the rear end of this being closed by a $1'' \times 1''$ Angle Bracket and a Double Bracket by which the house is attached to the Flexible Plate and the rails. The funnel consists of two U-Section Curved Plates and two $1\frac{11}{16}''$ radius Curved Plates and is attached to the deck by two Angle Brackets. The deckhouse and bridge unit is attached to the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate forming part of the deck, by a Flat Bracket and an Angle Bracket, in the manner shown.

Parts required to build the model trawler: 4 of No. 1; 4 of No. 2; 2 of No. 3; 9 of No. 5; 2 of No. 6a; 2 of No. 8; 3 of No. 10; 1 of No. 11; 9 of No. 12; 2 of No. 12a; 2 of No. 15; 1 of No. 15b; 2 of No. 16; 1 of No. 24; 8 of No. 35; 117 of No. 37a; 108 of No. 37b; 6 of No. 38; 1 of No. 44; 1 of No. 48; 7 of No. 48a; 1 of No. 51; 1 of No. 52; 1 of No. 126; 2 of No. 126a; 4 of No. 188; 4 of No. 189; 3 of No. 190; 2 of No. 191; 2 of No. 199; 2 of No. 200; 1 of No. 212; 2 of No. 215; 1 of No. 217a.



The Two "*Mauretanias*"

By W. J. Bassett-Lowke, M.I.Loco.E.



A model of the original "Mauretania," with one of the new "Mauretania" above it. Comparison of the two models give some idea of the progress of ship design in the last quarter of a century.

WHEN a ship with a name so famous as "*Mauretania*" enters our Merchant Service, it is only natural that we seek to compare it with the vessel that formerly bore the name. The two ships were built with rather different outlooks. The old "*Mauretania,*" whose maiden voyage was made in November 1907, was built with the primary object of winning the Blue Riband of the Atlantic. The then holders were the Germans, who with their fine fleet of four vessels "*Kronprinz Wilhelm,*" "*Kaiser Wilhelm II,*" "*Kaiser Wilhelm der Grosse*" and "*Kronprinzessin Cecilia*" had reached the highest development in reciprocating steam engines, and it was up to British engineers to do something better.

Experiments made by the Cunard Company with the "*Caronia*" and the "*Carmania,*" two exactly similar vessels with the exception that the first was fitted with reciprocating engines and the second with geared turbines, proved that there were great possibilities for a huge fast turbine liner. The "*Lusitania*" and the first "*Mauretania*" were the outcome of this development and were subsidised by the Government.



This view of the model of the new "Mauretania" under construction shows her cruiser stern.

The present "*Mauretania,*" whose maiden voyage began on 17th June last, has not been built as a record-breaking ship. She is one of the most beautifully equipped of modern ships and possesses the best features of North Atlantic travel for the passenger who values comfort and with whom speed is not the vital factor.

From these two view points it is interesting to compare the ships. They do not differ greatly in tonnage or in main dimensions. The new "*Mauretania*" is slightly the shorter, but is broader in the beam and slightly higher in gross tonnage. The original "*Mauretania*" was 785 ft. long, 88 ft. wide, and had a gross tonnage of 31,938; the corresponding figures for the new "*Mauretania*" are 772 ft., 89 ft. 6 in. and 34,000 tons.

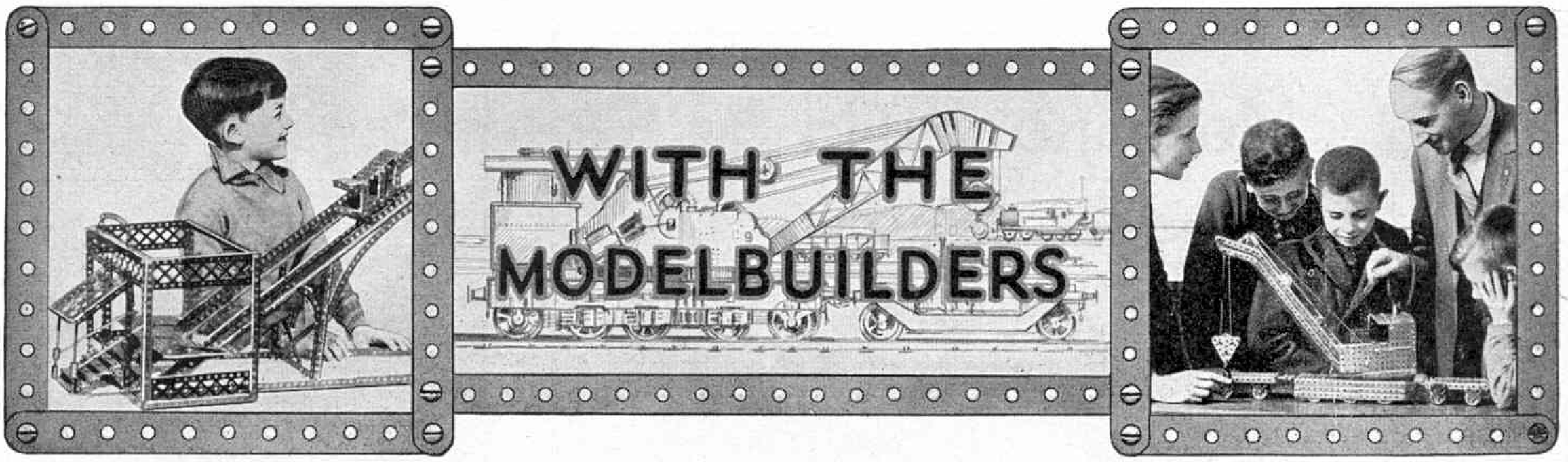
External measurements cannot convey very much of the progress that has been made in the last quarter of a century, however. This is very largely internal, in the size of the cabins and in the provision of such amenities as bathrooms, larger and more elaborate public rooms, gymnasiums, swimming pools, and better facilities for entertainment. Admittedly the two vessels show much contrast in external detail. Ships of the old "*Mauretania's*" day carried so much gear on deck, including tall masts and funnels with their numerous stays, deck lights and a forest of cowl ventilators. The illustrations at the head of this page show that on the new vessel the old system of ventilation has disappeared entirely, and there is plenty of deck space clear for games and promenading. Time was when at least four funnels would have been required for a liner of her size, but marine engineering to-day has progressed to such an extent that the two short raked funnels of the new "*Mauretania*" are well capable of carrying away the smoke and gases.

Both these illustrations are from models, which give an excellent means of comparison and contrast. The model of the old ship is built to the scale of $\frac{1}{4}$ in. to 1 ft. and therefore is 18 ft. 6 in. long. It is now on view in the main booking hall of the Cunard Building at Liverpool, a permanent memorial to our Blue Riband holder for 22 years. Visitors to Winchester Cathedral will have noticed another model of this vessel of exactly the same size that has been dedicated to seamen using Southampton.

The new "*Mauretania*" model was made quite recently for her builders, Cammell Laird and Co. Ltd., and is now at their Birkenhead headquarters. It was built to the scale of $\frac{3}{16}$ in. to 1 ft., and therefore is just over 12 ft. in overall length.

There is an interesting structural difference between the sterns of the two models. The old "*Mauretania*" had the sharply receding yacht or counter stern, while her more modern sister affects the warship stern known as the "cruiser" stern.

What will the "*Mauretania*" of 50 years hence look like? Will she have no funnels, like some Japanese ships of to-day? To whatever generation she belongs, her famous name will always set a standard of excellence and modernity.



A MECCANO MODEL OF THE WORLD'S LARGEST TELESCOPE

Recently we received from J. Mercé, Paris, details of a Meccano model of the great 200-inch telescope that is now under construction for the Mount Palomar observatory in California. Readers will remember that this giant instrument was described on page 154 of the "*M.M.*" for March 1938 and it was the account there given that inspired Mercé to commence his model. So far only the tube is complete and this is built as closely as possible to scale. Each end of it consists of Ring Frames, and these are connected by Angle Girders placed in exactly the same positions as the girders of the prototype. The upper ring of the tube, which carries the observation chamber and prime focus mirrors, also is built from Ring Frames connected by 4½" Angle Girders and braced with Strips, while the observation chamber in the centre of the ring is built up from two Boilers. These are bolted end to end and are supported from the sides of the ring by Strips.

If the mounting and other parts of the model still remaining to be constructed are built with the same degree of skill and realism as the tube, the completed model will be a very fine piece of work, and I hope to include further details and possibly an illustration of it in the "*M.M.*" in due course.

IMPROVEMENTS TO MECCANO SCREWED RODS

R. Kale, Poona, India, puts forward the interesting suggestion that Meccano Screwed Rods should be manufactured with a slot cut in each end, the idea being that a screwdriver could then be used to turn the Rod to facilitate the fitting of Nuts, Threaded Bosses and other parts. As we have never experienced any difficulty in this respect, except when the threads have become burred through rough usage, we do not think much advantage would be gained by the cutting of these slots, which would weaken the ends of the Rods and would be likely to "burr," thus making it difficult to start nuts on the threads.

MINIATURE GUNS FOR SMALL SHIPS

Having read the article, "*The British Navy in Meccano*," which appeared in the June issue of the "*M.M.*," A. Reeve, Melton Mowbray, makes an interesting suggestion regarding the construction of miniature naval gun turrets suitable for simplicity model warships. Washers are usually used for this purpose, but Reeve finds it a good plan to make turrets from small pieces of cork. The cork can be cut to the required shape and bolted to the deck of the model ship. Pieces of wire or Spring Cord pushed into the cork make realistic gun barrels.

AN INTERMITTENT ROTARY DRIVE

Intermittent drive mechanisms are often required in model-building for operating the tool-feed on model machine tools such as planes and drilling machines, and model-builders will be interested in a simple drive of this kind suggested by L. Jones, Liverpool. In his scheme, a 57-teeth Gear is fixed on the Rod to be driven and a Spring Clip is fitted on a second Rod. The wings of the Spring Clip engage with the teeth of the 57-teeth Gear. The scheme is suitable only for light drives as the Spring Clip tends to turn on the Rod when overloaded.

MECCANO ROLLERS

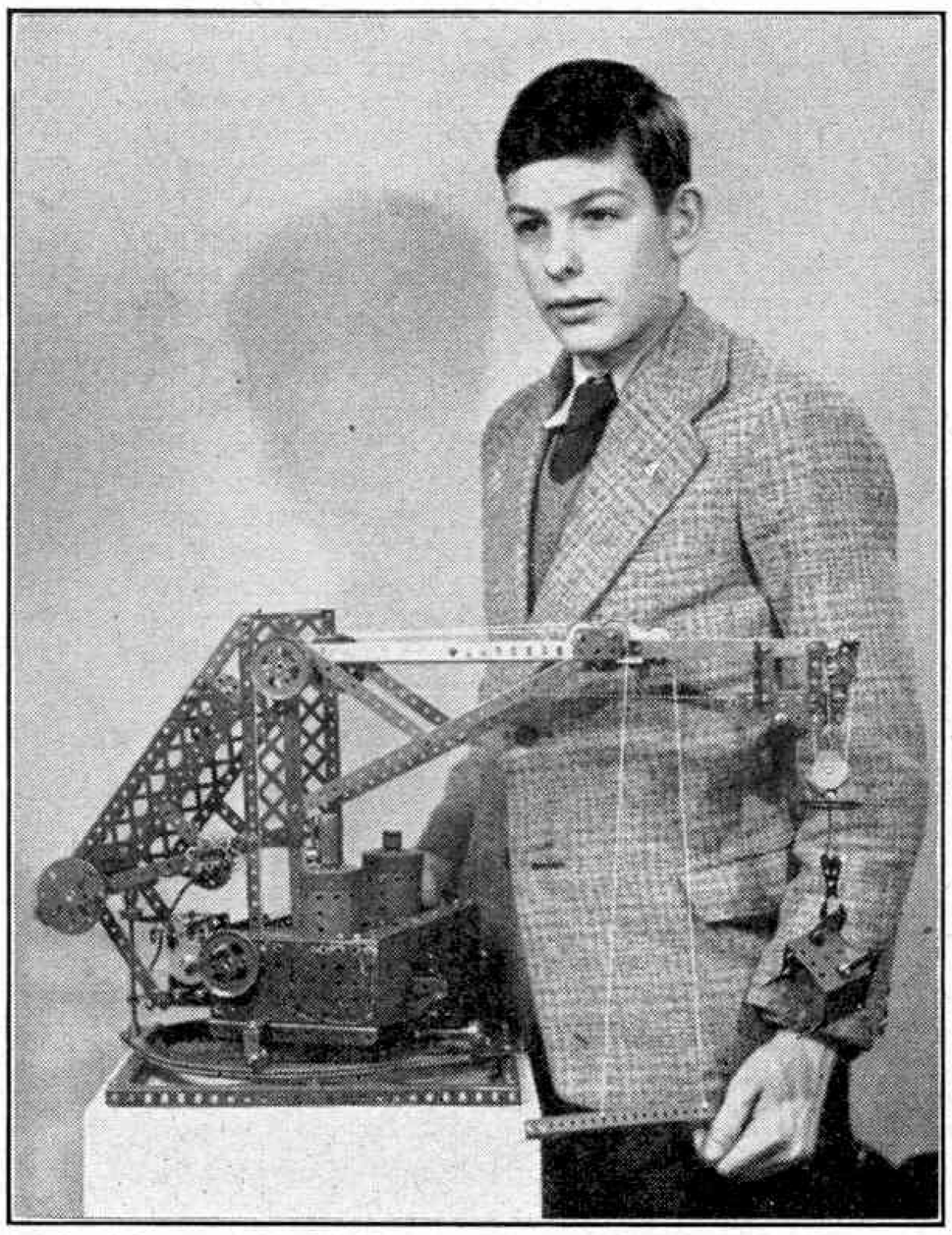
When assembling small roller bearings or fitting sliding tables in models such as planing machines it is necessary to provide small rollers to run between the sliding surfaces. Generally ½" Pulleys or Collars are used for this purpose, but Collars have the disadvantage that their tapped holes do not permit smooth running unless matters are so arranged that the holes do not make contact with the bearing surfaces. C. Laird, Glasgow, points out that the bodies of the Spring Buffers (Part No. 120a) make excellent miniature rollers, which can be supported on Rods, Pivot Bolts or similar parts. Another interesting use for these parts is also pointed out by Laird. When fitted on top of the cylinder block of a dummy engine they form realistic sparking plugs.

A NOVEL PILE-DRIVER MECHANISM

In building a model pile driver J. Bowden, Bournemouth, found it good fun to operate the pile driving weight by means of an electro-magnet. He built his model on the usual lines, but incorporated an electro-magnet in the lifting gear. The weight is free to slide freely in guides and is raised by the electro-magnet when current is switched on. When the current is cut off the weight falls on the pile, and then the magnet is lowered so that the weight can be lifted once more to the top of its guides. The mechanism is one that is capable of other applications, and we shall be glad to hear from readers who are able to make other use of it and to learn of their ideas.

A SIMPLE BRAKE FOR SMALL MODELS

When designing simple hand-driven models such as pit-head gears, elevators, cranes and similar models in which some form of winding gear mechanism is fitted, provision must be made for retaining the lift cage or load in any position desired when the handle is released. L. Ford, Stoke, has worked out a simple device for this purpose that can be fitted to the Crank Handle and is effective in preventing it from turning. He fixes a Spring Clip on the Crank Handle, arranging it so that by sliding the latter a little to one side the wings of the Clip engage with an Angle Bracket fixed to the frame of the model. If necessary a light spring can be fitted to the Crank Handle so that normally the Clip is in constant engagement with the Angle Bracket, and must be pushed sideways when it is desired to hoist or lower a load. The brake automatically engages on releasing the Crank Handle.



Paul Erichsen, a keen Swedish Meccano enthusiast pictured with a model floating crane that he has designed.

AIR GUN TARGETS

One of the most popular pastimes with boys is the arrangement of shooting contests with air-guns and the excitement of the game is increased by the use of Meccano mechanisms for automatically re-setting the targets when they are hit. Several model-builders have sent us details of ingenious mechanically-operated targets that they have designed, and the following descriptions of a few of them will be of interest to young marksmen.

One of the most simplest devices is that designed by P. North, Chester, who uses an ordinary bull's eye ring target. This is mounted on the front of a box made from Meccano Plates, an opening half inch square being left behind the "bull's eye." The gong of an Elektron Electric Bell is fixed directly behind the opening. When the device is in use, a cardboard target is clipped in place by Strips, but the "bull's eye" is cut out so that a shot "on the mark" passes through the opening and strikes the gong.

This idea can be varied by mounting a Strip pivotally behind the opening. A 6 B.A. Bolt "earthed" to an arm attached to this Strip is arranged to make contact with a second insulated 6 B.A. Bolt. The two Bolts are wired in series with a battery and pocket lamp bulb, and the Strip is fitted with a light spring. When a bull's eye is scored, the Strip is knocked and brings the two contacts together thus lighting the lamp to give a visual indication of the hit.

H. Thomas, Barrow, another keen marksman, prefers moving targets and he uses a Meccano Electric Motor to drive an endless belt that carries a number of targets in the shape of miniature aeroplanes. The accuracy of a shot is judged by the point at which an aeroplane is struck.

We are always glad to learn of practical ideas such as these and hope that other readers who have worked out novel uses for Meccano will write to tell us about them. Any information we receive that is likely to interest readers generally will be published in the "*M.M.*"

PUNCHING HOLES IN CARDBOARD

Many model-builders use pieces of cardboard or similar material for filling in spaces in large models, and fix them in place by Bolts passed through perforations made in their edges. The simplest way of boring holes in such materials is to use a bradawl, but the finished hole is not very neat. A better plan is to make a template or guide from several Strips and then place the material between them. Holes can then be punched with a tool such as a Meccano Rod or Screwdriver withoutsplintering or tearing.

An even easier method is to obtain a piece of tubing having the same outside diameter as a Meccano Rod and to file one end of it to a sharp edge. This simple tool can then be used with a hammer, without the need for a template.

SPOKED WHEELS FOR MECCANO MODELS

In building reproductions of early motor cars and bicycles model-builders often find that they require spoked wheels. Generally Hub Discs and Artillery Wheels are found to be satisfactory but in cases where greater realism is required a suggestion put forward by R. Pierce, York, is worth trying. He finds that it is easy to assemble built-up spoked wheels providing the job is tackled in the correct way. First he makes a circle of Strips to form the rim of the wheel. The spokes are formed by Screwed Rods. He fixes these by lock-nuts to the wheel rim and then attaches their inner ends to Double Brackets passed on to the wheel axle.

A realistic tyre similar to the solid type used on early motor cars can be made from a length of Kemex Rubber Tubing fixed to the rim by thread.

An alternative method is to use the Circular Strip, Part No. 145, for the rim. Strips, Rods or Screwed Rods form strong spokes, and the hub can be made from Bush Wheels. Rod and Strip Connectors or End Bearings serve to hold the spokes.

Meccano Guild

Secretary's Notes

The Holiday Month

I wish all members the best of opportunities for splendid healthy fun during the holiday season. August is not a month of great activity in the club room, but is important because it usually gives splendid opportunities of gathering new ideas to be put into practice during the coming Winter Sessions. I am sure that members need no urging from me to keep a look out for matters of interest. Whether they travel by road or rail they are sure to see many possible subjects for new models, and to visit interesting places that may be made the subjects of good short talks at special meetings. Such talks would make a very interesting programme feature. Small prizes could be awarded for the best efforts, with members themselves acting as judges, placing the talks in order of merit by vote.

I should like to hear something directly of members' activities during the holiday season. Club Leaders and secretaries are regular correspondents, and I enjoy the interesting comments on club events in the letters that invariably accompany reports, but I do not get a sufficient number of letters from members themselves. I hope that in this respect there will be a decided improvement during the coming months, and particularly during August. I should also be glad to see more holiday photographs, especially group photographs of club or Branch officials and members on excursions or visits. Those that are suitable would be reproduced in these pages.

A Seaside Invitation

The miniature railways that provide fun and interest at many seaside places and other holiday resorts have a special attraction for club and Branch members, who watch their tiny steam locomotives with great admiration and eagerly compare them with the full-sized engines of British railways. The article that appears on page 452 of this issue will give some idea of the fascination that seaside lines exert. For instance, it contains a splendid description of the Lakeside Miniature Railway, Southport, which runs alongside the Marine Lake and connects the Pier with Pleasureland. This line is one of the oldest of its kind in England, and certainly one of the finest. It owes much of its interest to the enthusiasm of Mr. Barlow, its owner, who is probably the only man in England who can claim to be the sole possessor of a passenger railway.

Mr. Barlow has built his own locomotives in his workshop alongside the line. He is very proud of them and supervises them himself to make sure that they are always in perfect running order. Nothing pleases him more than questions from admiring visitors, and club and Branch members who can visit Southport and this fine railway during the holiday season should make a special point of wearing their badges and of making themselves known to its owner. Mr. Barlow will be doubly interested in them when he finds that they are connected with the Guild or Hornby Railway Company, and will tell them the story of his delightful line, and show them all there is to be seen.

Looking Forward

Although these notes will appear in the midst of the summer holiday season, it is not too soon to start thinking about the coming Winter Sessions. I have often insisted on the need for forethought in planning proceedings, and this is more than ever necessary in view of the increase in the number of clubs and the greater keenness of members.

One of the first things to call for attention is the need for recruits. Even a large club should never let slip opportunities of adding to its numbers, for no real progress can be made unless new members are introduced, particularly younger boys who will gain experience in club life that will fit them for posts as Section Leader, secretary or treasurer. How to advertise the existence of the club during the coming months therefore should be considered, and members too should be urged to bring their friends to the meetings, especially those who are likely to become keen and valuable members. Personal efforts of this kind are the most effective. In many clubs the Leader makes a practice of visiting the homes of members who have not attended one or two meetings, to cheer them up if they are ill, to try to satisfy them if they have grievances, or to encourage them to new efforts if they have just lost interest. One Leader tells me that on visits of this kind he travelled 16 miles by car and bus on one evening, and added that he thought the time and labour well spent.

Another matter that might be considered by Leaders and officials is the club room itself. Possibly some slight alteration in the tables, store cupboards and other fittings would enable better work to be done, or the provision of more room would be an advantage. The club room itself should be made as attractive as possible, for good work is never done in cramped and dingy surroundings. All material too should be carefully examined, and a general overhaul should be the preliminary to the coming Winter's work. Members usually enjoy efforts of this kind.

Next the programme itself should be given thought. Experience will have shown what kind of meetings members enjoy most, and these should be continued. At the same time suggestions for new features should be called for, and these should be discussed at a preliminary general meeting, at which members will decide by vote which shall be adopted.

Whatever the actual programme, provision should be made for competitions of all kinds, for members enjoy nothing better than keen friendly rivalry. Model-building, talks, railway operations and other customary programme features can be made the subjects of interesting competitions, and a special competition night for games and puzzles is a source of great fun.



Meccano Club Leaders

No. 98. Mr. A. Rodger

Mr. A. Rodger, who recently took over the Leadership of the Breich M.C.; secretary, M. Anderson. This Scottish club's connection with the Meccano Guild dates from June 1936, and excellent progress has been made since that time. The programme provides for a variety of interests among the Junior and Senior members. Model-Building is a firm favourite, and Hornby Railway operation, woodwork and stamp collecting also receive considerable attention. Lantern Lectures and Talks are given frequently.

The Correspondence Club

The Correspondence Club continues to expand at a surprisingly rapid rate. At the moment there is a great demand for correspondents in Australia, New Zealand, South Africa and Canada, and also in the United States, and a Guild member in any of these countries who would like to have a pen friend will be satisfied almost immediately he sends in his application form. I shall look forward to enrolling many new members of the Correspondence Club from these parts of the world. Cards on which to fill in details will be sent immediately to any Guild member who writes to tell me that he wishes to join the club, and I will look out for a pen friend for him as soon as I know in which country he would like to have a correspondent and what hobbies and interests he wishes to write about.

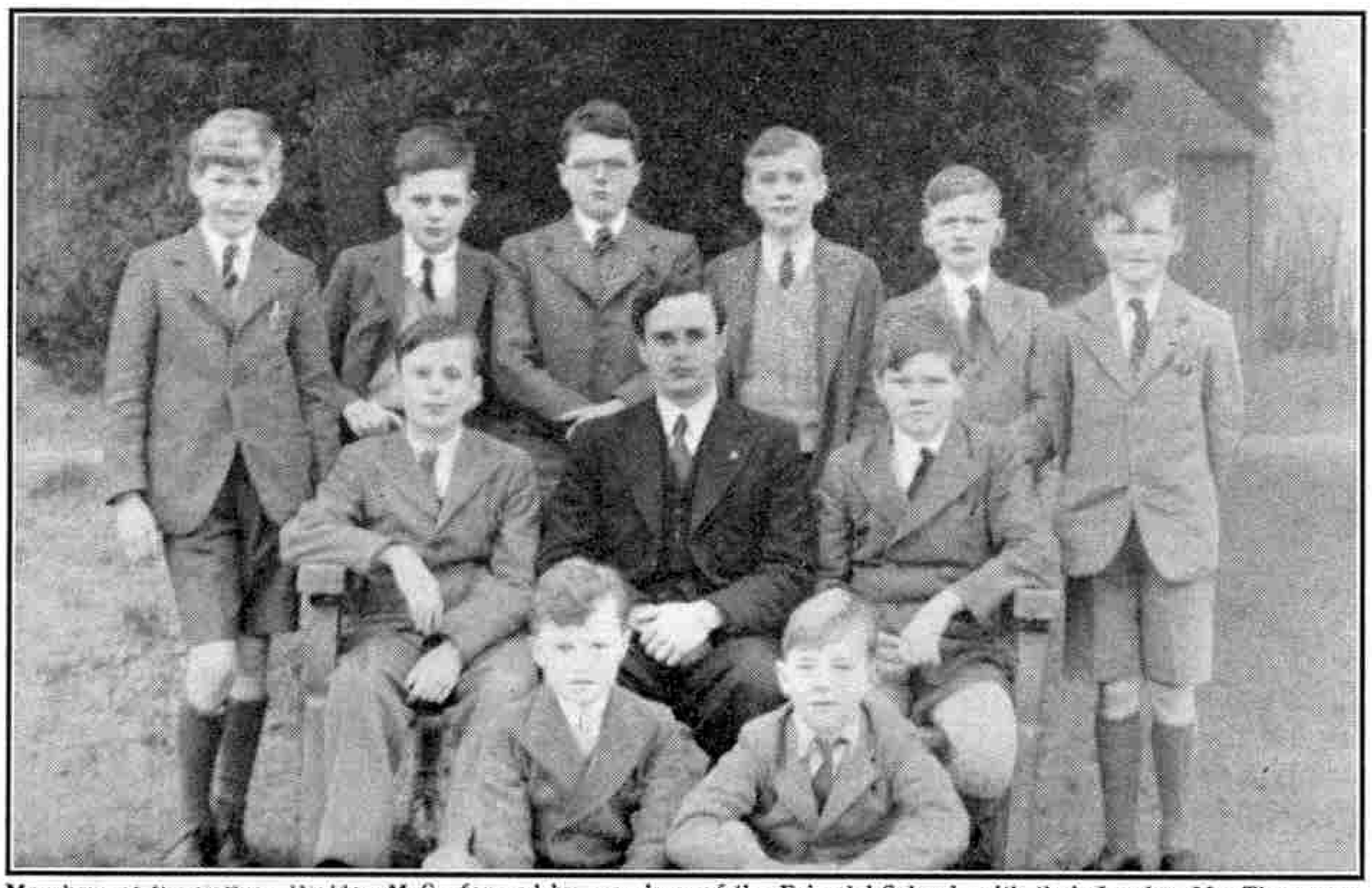
Proposed Clubs

Attempts are being made to establish Meccano clubs in the following places, and boys interested should communicate with the promoters, whose names and addresses are given below.

DUDLEY—J. B. Simcox, St. Columba, Priory Close, Dudley, Worcs.

NAAS—P. Fitzsimons, The Kennels, Naas, Co. Kildare, Eire.

RUISLIP—R. Cain, 30, South Drive, Ruislip, Middlesex.



Members of the Saffron Walden M.C., formed by members of the Friends' School, with their Leader, Mr. Thompson. The secretary is J. Fairbanks. This club was affiliated in June 1937, and model-building and model railway working have been the main feature of the programme. The club layout has Meccano viaducts and bridges, and members are at present engaged in electrifying the track.

Club Notes

Exeter M.C.—Ships, motor cars and bridges have been popular subjects for model-building at recent meetings, and a particularly fine model funicular railway has been built. A Corinthian Football League has been formed, and a trophy and medals provided for competition. Further visits have been made to the West of England Blind School, where pleasant times have been spent building models and playing games with members of the school. Club roll: 60. *Secretary:* J. T. H. Fenwick, 45, Calthorpe Road, Exeter.

Beeches (Jersey) M.C.—Several games of cricket have been played. In a recent model-building competition new members were prominent, the winning model being an electrically-operated crane. Enjoyable outings have been spent, members bathing and playing games. A Visit to the works of the Jersey Tobacco Company proved very interesting. Club roll: 23. *Secretary:* H. Dubras, 57, King Street, St. Helier, Jersey, Channel Islands.

Islandmagee M.C.—Small prizes were offered in a Programme Suggestions Competition, and members' ideas proved valuable to the committee when considering the programme for the Summer Session. A football pitch and equipment have been acquired, and several matches have been played. It is hoped to arrange regular matches next winter. Sports equipment has been purchased, and active outdoor meetings are being enjoyed. The third issue of "*The Gazette*" has proved as popular as its predecessors. Correspondence with other clubs in all parts of the world is being carried on, and the secretary will be pleased to hear from officials of other clubs. Club roll: 22. *Secretary:* S. McCready, "Hillmount," Islandmagee, Co. Antrim.

Northampton M.C.—At the General Meeting held in conjunction with the associated Branch of the H.R.C. at the end of the Winter Session, P. W. Samwell was presented with a Merit Medallion, and prizes were awarded to the winners of the Football Knockout and Darts Competitions. The usual Model-building Evenings have continued and Tennis and Cricket have been played. A Summer Photograph Competition has been organised. Club roll: 8. *Secretary:* E. F. Billingham, 187, Birchfield Road East, Northampton.

Great Baddow M.C.—At a meeting held early in the Summer Session the programme was discussed and arranged. Cricket and swimming are the chief recreations followed. On Empire Air Day members visited the display at Felixstowe. Several meetings were spent preparing the club room for the Exhibition, which was open for two days and was very successful. The large display of models included a loom, a motor chassis, a robot and an exploding ship. A large Hornby Railway also formed part of the Exhibition. Club roll: 20. *Secretary:* K. J. Avis, 3, Crescent Road, Chelmsford.

Folkestone M.C.—Model-building Contests have been held at several meetings. Holiday working of the Meccano dock cranes on the Hornby layout was carried out successfully. Several Games Meetings have been held. A realistic and detailed model motor launch built by members has gone into "service," and model aeroplane activities have been commenced. Club roll: 7. *Secretary:* W. F. Cotter, 68, Linden Crescent, Folkestone.

Barnard Castle School M.C.—A more extensive stock of Meccano is available at meetings, and an ambitious model-building programme has been planned. The design of a Meccano overhead railway is being worked out, and construction on the model will be commenced soon. Dinky Toys will be used to give it a more realistic appearance. Two more members have joined the Meccano Section. Club roll: 18. *Secretary:* A. Coates, The School, Barnard Castle.

St. James' (Grimsby) M.C.—Members are constructing models for display at a bazaar to be held in the Grimsby Town Hall. Work in hand includes a giant dragline, a "Baltic" tank locomotive and a meccanograph, while the Aeroplane Section of the club is making scale models of the Hawker "Hurricane" aircraft and other larger machines. An interesting Visit has been paid to an aerodrome. Club roll: 15. *Secretary:* G. H. Howard, 8, New Haven Terrace, Grimsby.

Stretford Public Libraries M.C.—Model-building meetings have been held, the best effort being a 15th century sailing ship. Papers on various subjects have been read by members, and competitions have been popular. Stamp Section meetings have been well attended, and a Talk on "*Some Interesting Stamps in My Album*" has been given by a member. Games have been enjoyed as usual. Club roll: 35. *Secretary:* Miss F. Scattergood, Public Library, Technical Institute, Stretford Road, Old Trafford, Manchester 16.

Old Charlton M.C.—Members have quickly settled down in their new club rooms, and the normal programme has been resumed. On Model-building Nights cranes, bridges and tanks have been built, in addition to interesting "Simplicity" models. On one evening the secretary's model railway was operated. Lectures on "*Model Mills*," the "*Marie Celeste*" and "*Eastleigh S.R. Works*" have been given. Two-minute talks continue to be popular. A further attractive issue of "*The Meccanic*" has been produced, and this includes an interesting "What Is It?" Contest. Club roll: 20. *Secretary:* D. C. Lambert, 23, Charlton Lane, Charlton S.E.7.

Pettit's Senior Boys (Romford) M.C.—A No. 9 Meccano Set has been purchased, and model-building is in full swing. Several new members have been enrolled. Photography has been introduced, and a dark room and all necessary apparatus provided. Members are making a notice board and a frame for the Club's Affiliation Certificate. Preparations are in hand for an Exhibition. Club roll: 20. *Secretary:* A. Dawson, Pettit's Senior Boys School, Romford, Essex.

Hornsea M.C.—There have been good attendances at the meetings of the various sections of the club. On Hornby Evenings trains have been run on a large oval layout with three tracks and two goods yards. Cinematograph shows have been enjoyed, and on Games Evenings the ever-popular "Mah-Jong" has been played. Instructive Talks on many subjects have been given, and members have given accounts of interesting experiences, such as "*A Visit to An Aerodrome.*" Debates also have been included in the programme. On several fine days members have been boating, and games of bowls have been enjoyed. Club roll: 15. *Secretary:* P. Richardson, "Summerleigh," Esplanade North, Hornsea.

Saltash Model Engineering Club.—Steady progress is being made by the Meccano Section in the construction of a model horizontal steam engine. The Model Section have finished a coal depot, and an overhead signal box and cattle dock are nearing completion. Work by both Sections was displayed at the recent Exhibition of the Plymouth M.C. The President, Leader, and a number of members of the Plymouth M.C. have visited the club room, which has been brightened up by the use of posters. Club roll: 9. *Secretary:* B. R. J. Braund, 9, Homer Park, Saltash.

Islington M.C.—Junior and Senior members hold their meetings on separate nights. In addition to model-building and train running on an extensive layout, two evenings each week are devoted to fretwork. Many useful articles and interesting models have been made, including some particularly realistic battleships. Regular visits have been paid to Hampstead where members can sail model yachts. A series of short Talks on films have been given by members. Members enjoyed a trip round a number of London shops and shipping offices, at which model ships and aeroplanes were on show. Cricket has been played. Club roll: 12. *Secretary:* F. Warren, 48, Leigh Road, Highbury, London N.5.

Sid-Vale (Sidmouth) M.C.—A number of outdoor meetings have been greatly enjoyed. These included a Ramble to Harpford village and woods that was very successful, although it must be confessed that the first part was covered in a bus! During other Rambles stops have been made and games of rounders or cricket enjoyed. Club roll: 12. *Secretary:* L. R. I. Gliddon, Sheffield House, Sidmouth.

Breich M.C.—A number of cricket matches have been enjoyed. The club's birthday party took place recently and Merit Medallions were presented to deserving members. Among Meccano models built is an effective fan that has proved very useful on hot days. Club roll: 8. *Secretary:* M. Anderson, 36, Breich Terrace, West Calder.

Acton M.C.—Train running to timetable has been enjoyed on the club railway layout. Members have each been allotted a position and promotion can only be gained by good work. Train movements are controlled by a special buzzer code. Improvements to the layout have resulted in smoother train running. The stations on the main line have been named "Weatherbridge," "Rorke Junction" and "Portborough," while the branch line terminus is known as "Buggleskelly." An interesting Lecture on "*Re-organisation at Chiswick Bus Works*" has been given by the Vice-Chairman, Mr. S. W. Page. This was particularly enjoyable as it was arranged in the form of an imaginary, personally-conducted tour of the works. Arrangements have been made for Visits to a number of locomotive sheds. Club roll: 14. *Secretary:* S. W. Simmonds, 7, Alfred Road, Acton, London W.3.

St. Stephens (Saltash) M.C.—There have been good attendances at the outdoor meetings that mainly comprise the Summer programme. Games have been played, and tennis has been very popular. Occasional indoor meetings have been held. Club roll: 14. *Secretary:* A. J. Summerfield, Castle View Farm, Saltash.

AUSTRALIA

Carnegie Methodist M.C.—At the beginning of the Summer Session it was decided to divide the club into Junior and Senior Sections, holding meetings on separate nights. An attractive programme has been followed, and a Model-building Competition was very popular. The club's extensive model railway is being electrified, and tinplate rails replaced with solid steel track. Club roll: 45. *Secretary:* J. T. Churchward, 46, Truganini Road, Carnegie S.E.9, Victoria.

Maylands M.C.—On the occasion of the club's fourth birthday a large gathering enjoyed tea and games. The first of a series of "Leader's Programmes" consisted of interesting questions, a small prize being given to the member writing the most correct answers. Every member was present at the annual Visit to the Midland Junction Railway Workshops, where they saw "*Murray*," one of 12 new "P" Class locomotives, nearing completion. At a Stamp Meeting a Talk was given on South Seas issues. Darts and "Dart Cricket" have been enjoyed, and on one evening each of the three Factions gave entertainments for which points were awarded according to their merit. Club roll: 27. *Secretary:* W. Petersen, 1, Warne Street, Maylands, Perth, Western Australia.

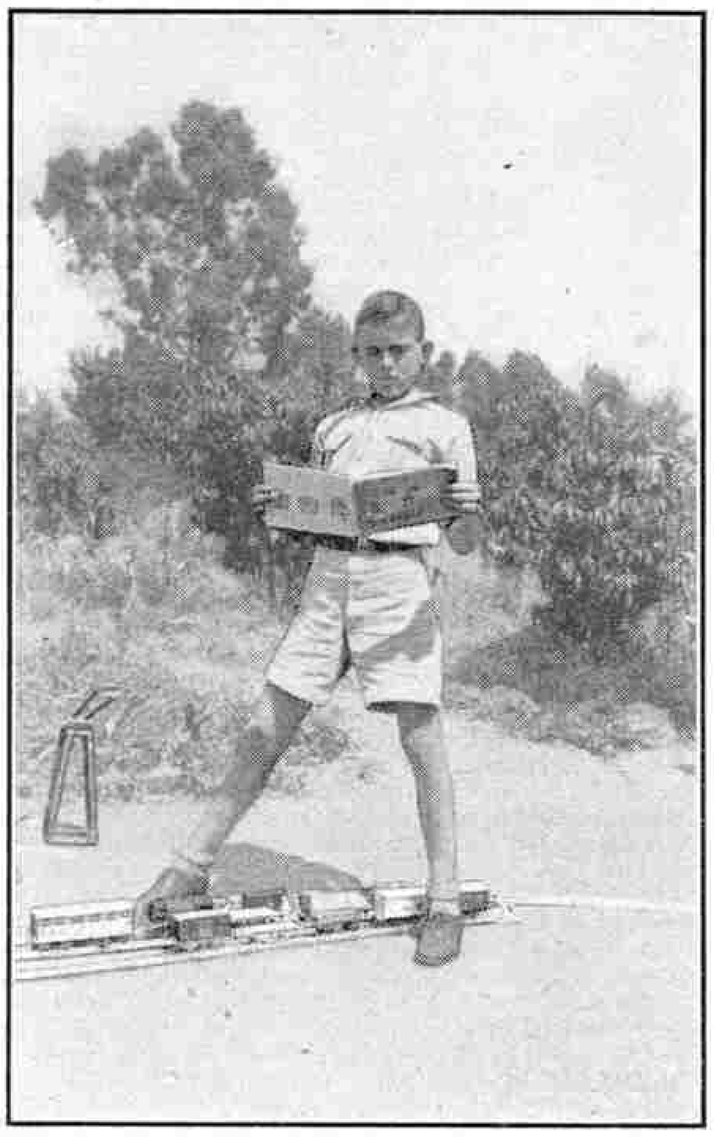
Melbourne M.C.—Following alterations to the club railway layout, adjustments had to be made to timetables. A remarkably high degree of efficiency has been attained in train control, and at one meeting train movements were recorded on a "control graph" similar to those in use on the Victorian Railways. Races between locomotives have provided amusement. Club roll: 10. *Secretary:* L. Ison, 8, Hayes Street, Northcote, N.16, Victoria.

EGYPT

Cairo M.C.—Weekly meetings have been held. A special meeting at the home of the Leader was devoted to games. New members have been enrolled. Members have enjoyed 25 days camp in Alexandria. Model-building has been enthusiastically carried out. Club roll: 42. *Secretary:* Sayed Fahmy Awad, 28, El Gezawi Street, Shoubra, Cairo.

NEW ZEALAND

Christchurch M.C.—The new club year was commenced with a meeting for the election of officers. A varied programme has been followed, and in addition to model-building and Hornby Railway working there have been games and competitions. An interesting Talk on the "*Queen Mary*" has been given by a member. Preparations are being made for the 10th Birthday Social. Club roll: 41. *Secretary:* D. H. Pratt, 102, Kerrs Road, Linwood, Christchurch.



S. Clopper of Pretoria pauses while operating his railway to read the "Hornby Book of Trains."

Hornby Railways in the Garden

Fine Layouts at Home and Overseas

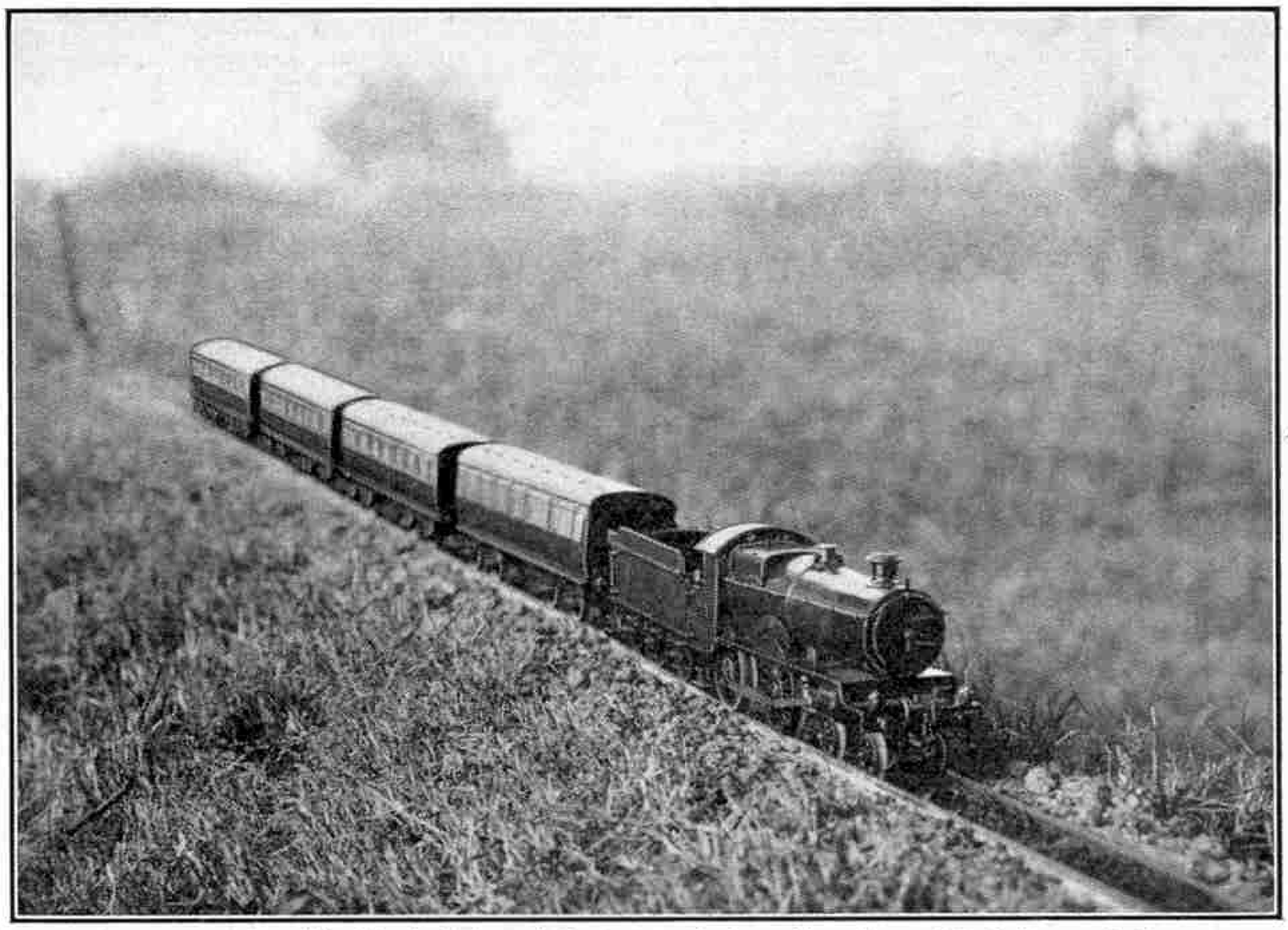
THE various model railways shown in the illustration on this and the following page are interesting in that they are all laid down out of doors. In periods of fine weather the appeal of fresh air and sunshine is irresistible, and many readers make a practice of running their trains in the garden during the summer months. On a fine, dry day this is really good fun, but it should be borne in mind that Hornby railway material is designed essentially for indoor use and should be brought indoors as soon as it is finished with. The various components, especially the rails, should then be wiped over with a slightly oily rag, to guard against the presence of traces of moisture that might cause rusting, which would spoil the appearance and efficiency of the parts.

It is not always easy to secure a level foundation for the line, so that the use of a baseboard of some kind will be found of advantage. If this is of wood, it can be arranged in sections and the railway can then be mounted on them; or the track can, if preferred, be simply laid down on the wooden pieces. A very good example of a layout arranged in this way is that shown in the lower illustration on the opposite page. This railway belongs to Michael Blease, of Hale, who is thoroughly enjoying himself with his trains. The track itself consists of a main oval with an inner connecting loop, and from the outer track there is a branch serving the engine shed. Passengers join the trains at a Hornby No. 3 Station, while one of the M Series Stations forms a useful "halt" on the opposite side of the track.

Some Hornby railway owners are fortunate enough to possess a permanent wooden structure out of doors on which their railways can be laid down when required. The garden railway shown in the upper illustration on the opposite page has a soundly constructed baseboard that is raised to a convenient height for operation. The trains can be seen better and their running is more fully appreciated when the track is raised, and the constant bending over necessary with a railway on the ground is avoided.

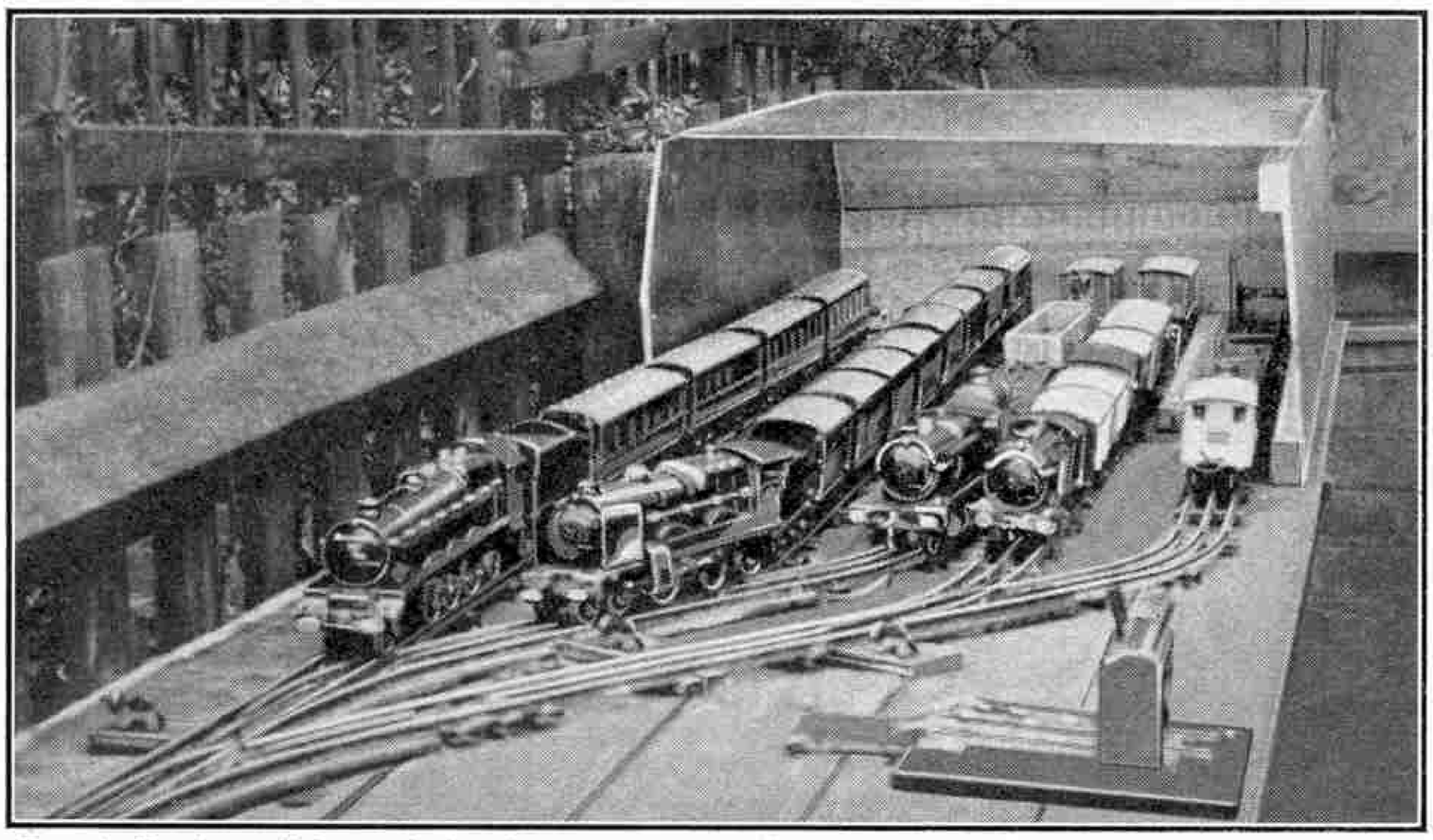
The system shown in this illustration is jointly operated by two boys, Norman and Jack Irvine of Blackpool, who spend a great deal of their time operating the system and in adding various refinements to secure more realistic working. The railway is electrically-operated, and the photograph reproduced shows an assembly of some of the locomotives and rolling stock. The heaviest trains are taken by one of the splendid Hornby *"Princess Elizabeth"* 4–6–2 models or by an E320 *"Royal Scot."* Smaller locomotives of various kinds are in use for miscellaneous duties and freight working. Since the photograph was taken electric light has been introduced in the stations and other buildings, and on signals.

The appeal of Hornby Trains is world-wide, and the photographs from which the two illustrations on this page have been prepared have reached us from Africa. In each case the railway shown is being operated out of doors, and it is interesting to note that in the upper photograph conditions make the employment of a baseboard for the track unnecessary. This railway, operated by S. Clopper, Pretoria, is laid out on a level walk that is admirable for the purpose. Tiled or concrete walks are very suitable for miniature railway purposes, and well-made pathways can also be taken over by the model railway engineer to form his track bed.



A "Cheltenham Flyer" in Nigeria. This realistic photograph shows the railway of H. C. Doyne, Ibadan.

The lower of the two illustrations shows an interesting example of a railway laid directly on the ground. This line is owned by H. C. Doyne, Ibadan, Nigeria. A railway can only be arranged successfully in this way if the ground is perfectly level, and if any grass with which it may be covered is cut very short. Clockwork locomotives object to blades of grass finding their way into the gears of their mechanisms! In this case the "permanent way" is laid down and ballasted in the regulation manner, but this method certainly can not be recommended in the English climate. It is only suitable for use where really long dry spells are the rule, and even then rails of non-rusting materials are advisable. The train shown in the illustration referred to looks most realistic, a Hornby G.W.R. "*County of Bedford*" with a train of No. 2 Passenger Coaches making a worthy representative in miniature of the "*Cheltenham Flyer*."



Heavy traffic at one of the terminal stations on the layout of Norman and Jack Irvine, Blackpool. The track is laid down when required on a permanent outdoor structure. Photograph by J. W. Ashfield.

Another "Overseas" layout, this time in Johannesburg, of which we have just received details is that of Mr. L. F. Houghton, H.R.C. No. 7783. This is an indoor system and it would be quite an undertaking to transfer it out-of-doors for a day's running, for it occupies a room measuring 42 ft. by 28 ft.! More than 100 Hornby Straight Rails and the same number of Curved Rails and Half Rails have been used in the construction of the track, together with innumerable points.

The working of the system is based on the practice of the L.M.S. and S.R. and it represents an imaginary "joint line." One operator cannot work the layout, and two of Mr. Houghton's friends therefore share in the duties. The system is divided into three separate sections. There are four terminal stations, representing Euston, Warwick, Birmingham and Southampton respectively, as well as four through stations named "Watford," "Bletchley," "Coventry" and "Woolston." Of the terminal stations "Euston" is particularly large, the main part being enclosed as in actual practice. Walls have been erected at the sides and a curved roof 3 ft. in height has been built over the platforms. The top is glazed with panes of mica, which gives a good representation of glass.

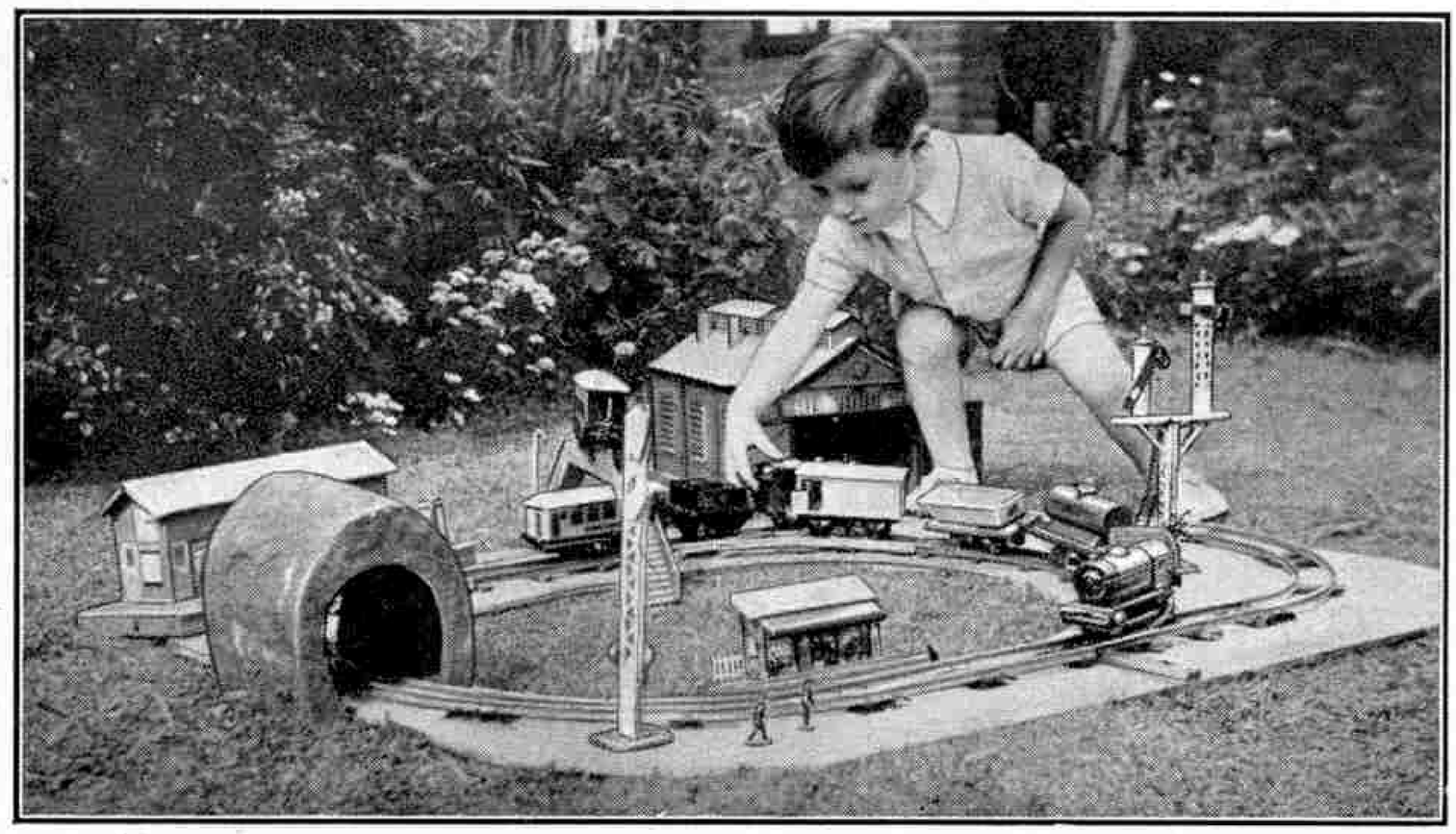
A small town has been constructed behind "Euston." All the buildings of this are made of cardboard, and the miniature "London Town" is gradually growing. Good use has been made of Dinky Toys and Pavement Sets to give life and realism, while Trees and Traffic Signs all play their part in making the appearance as effective as possible.

"Southampton" also is of particular interest, for it is situated on both sides of a row of model docks, which are built round a shallow tank of water in one corner of the room. Model ships can be seen floating in the docks, whilst not far away is a large aerodrome, given over to an air fleet composed of Dinky Toys Aeroplanes of various kinds. Boat trains are frequently operated from "Euston" to "Southampton," in addition to the usual expresses.

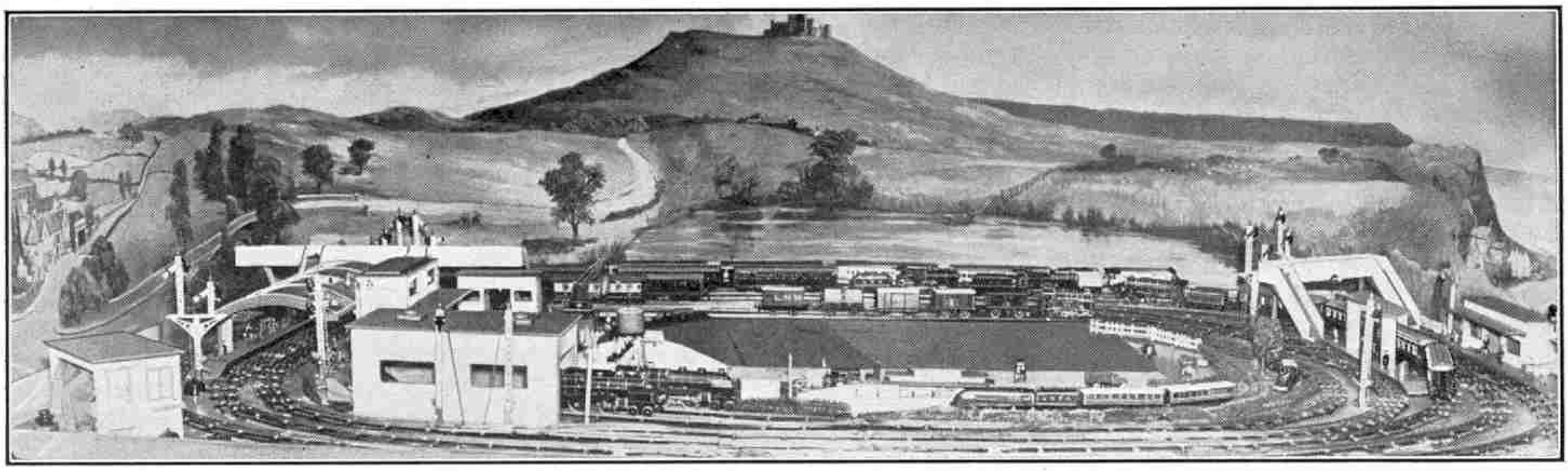
The track consists of Hornby Solid Steel Rails, and the motive power of course is electric throughout. All the accessories are electrically lit, and there are several Hornby Lamp Standards at each station. Day and night working is reproduced and the night operations are most effective, as everything is done by the light of the lamps and electrical accessories.

There are 11 Meccano Transformers, each supplying current to a certain section of the line. The sections are insulated from each other, so that a train can travel on one part of the layout quite independently of any other engines that may be in operation on other sections at the same time.

All trains run to a fixed timetable and there are four locomotives in use. The principal engine is a Hornby L.M.S. 4–6–2 No. 6201 "*Princess Elizabeth*." Other engines are a Hornby "*Royal Scot*" and a Standard Compound No. 1185, and the S.R. is represented by the now famous Hornby 4–4–0 Locomotive "*Eton*." The passenger rolling stock is composed of No. 2 Corridor Coaches, both L.M.S. and S.R.



Michael Blease, Hale, busy in the garden with his Hornby Railway. The rails are laid on a wooden baseboard.



The "Cragside" Railway

A Large Hornby Layout with Three Main Lines

IN the May 1934 issue of the *"M.M."* was published a description of a very interesting layout operated by Masters D. and E. Birkbeck of Newcastle-on-Tyne. At that time the layout was in the fairly early stages of development and occupied a space of 10 ft. in length by 7 ft. in width. During the past five years many improvements and alterations have been made, and the system has increased to such an extent that the table now required for its accommodation measures 13 ft. by 7 ft. 6 in. The busy scene the layout now presents can be realised from the photograph reproduced at the head of this page.

Originally the track consisted of a double line all round with connections from the inner track to a branch line and sidings. Subsequently a third main line was added and on the introduction of *"The Silver Jubilee"* of the L.N.E.R. between Newcastle and King's Cross a model of this train was introduced and operated on the new line. A Hornby No. 3 *"Flying Scotsman"* locomotive was rebuilt and repainted to represent the streamlined engines that work this train, and some coaches were repainted silver to represent the real *"Silver Jubilee"* coaches.

The layout is not operated all the year round, but is only worked intensively from December to February, the actual building up each year of the system being considered just as interesting as the running, if not more so. The track consists of Hornby Solid Steel rails and points. These are fixed on a three-ply wood base, in the centre of which is an operating space measuring 5 ft. by 3 ft., and the layout is very railway-like in its general arrangement.

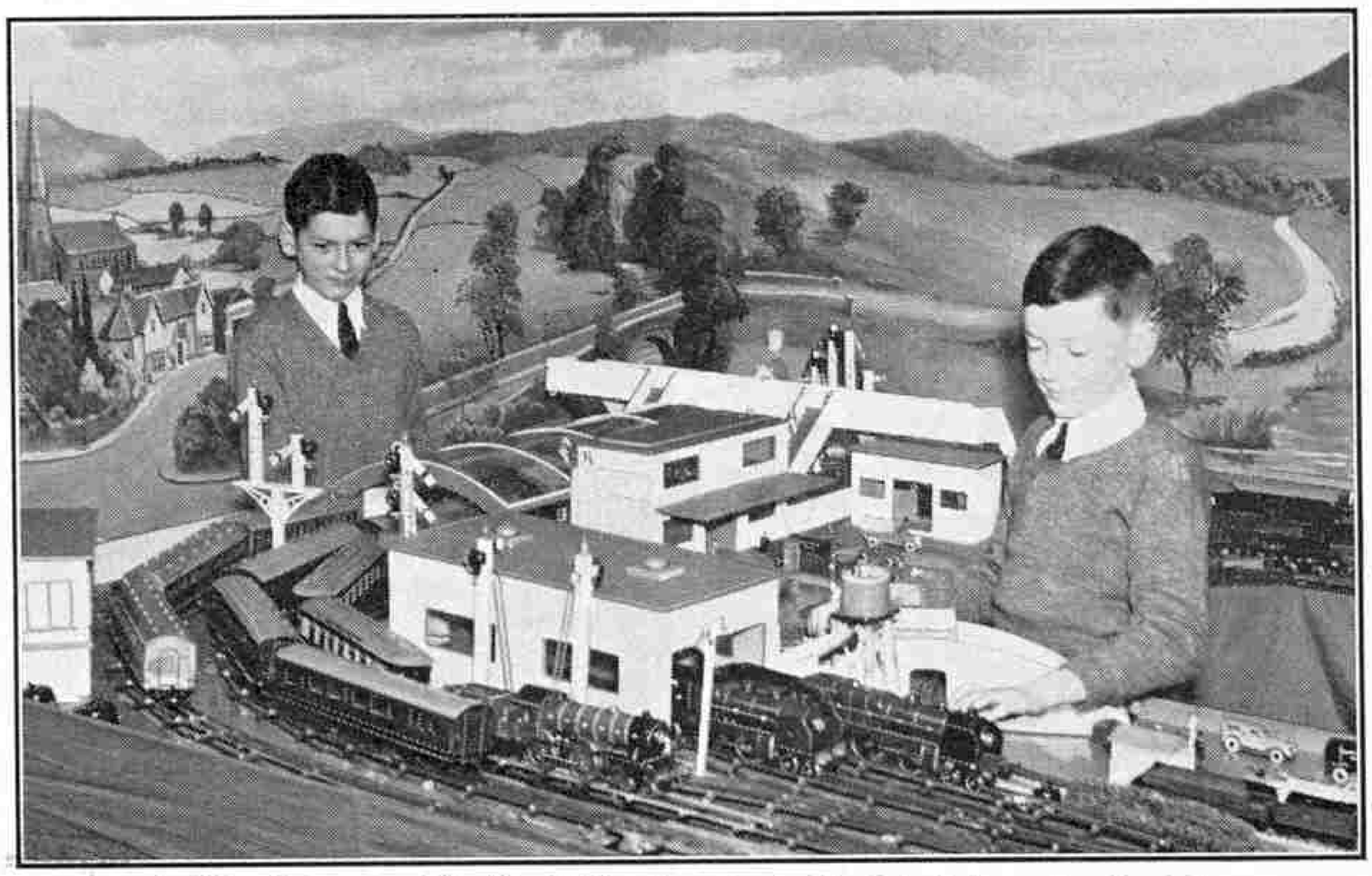
The centre track of the three main lines is for fast trains, and of course has connections with the inner and outer tracks. It runs alongside a platform only at the "Main Station." At the "District Station," which is about half way round the circuit, there are only two platforms, for trains running on the outer track, but the arrangement of the crossovers makes it possible for the fast trains to call at the "District Station" when desired.

The station buildings are home made, designed and built in the modern style, and the "Main Station" has a detachable celluloid roof. All buildings are lighted from a 6-volt accumulator, which also supplies power for the signal lights. The signalling arrangements of this layout are not yet controlled, but it is hoped to introduce an automatic scheme next winter.

The goods station and yard are reached from the branch line, which leaves the main line just after the "Main Station" and joins it again about mid-way on the circuit between the two stations. The sidings are under separate control from the main line, and shunting operations can be carried on in them independently of what is happening elsewhere on the layout. Connections to the engine shed also are made from the branch line, and the shed can be reached from any of the main lines by a series of shunting movements.

The rolling stock is made up of both L.N.E.R. and L.M.S. vehicles, although the line is essentially an L.N.E.R. one. In addition to the converted *"Flying Scotsman"* used on *"The Silver Jubilee"* express there are a second engine of this type in its original form, three 4–4–0s of the popular Hornby "Shire" class, an L.M.S. Standard Compound and various other engines.

Normally the combination of both Gauge 0 and Gauge 00 systems is not encouraged, because the former appears to dwarf the latter, or the smaller system makes the other look exceptionally large and cumbersome. On this railway the two have been laid out on the same board without spoiling the realistic effect of either, the smaller-scale models looking very much like one of the miniature railways that are to be seen in a few places alongside lines of normal gauge. The Hornby-Dublo system is laid round the operating space in the centre of the board. It consists of a single track with loop lines and sidings, a home-made engine shed and a station. Each of the two systems is fenced in accordance with the rules governing actual practice, and the entire layout is surrounded by a hand-painted background of exceptional realism.



An interesting corner of the "Cragside" railway showing the Main Station and engine shed.

HORNBY RAILWAY COMPANY COMPETITION PAGE

Join the Hornby Railway Company and become eligible for the competitions announced on this page.

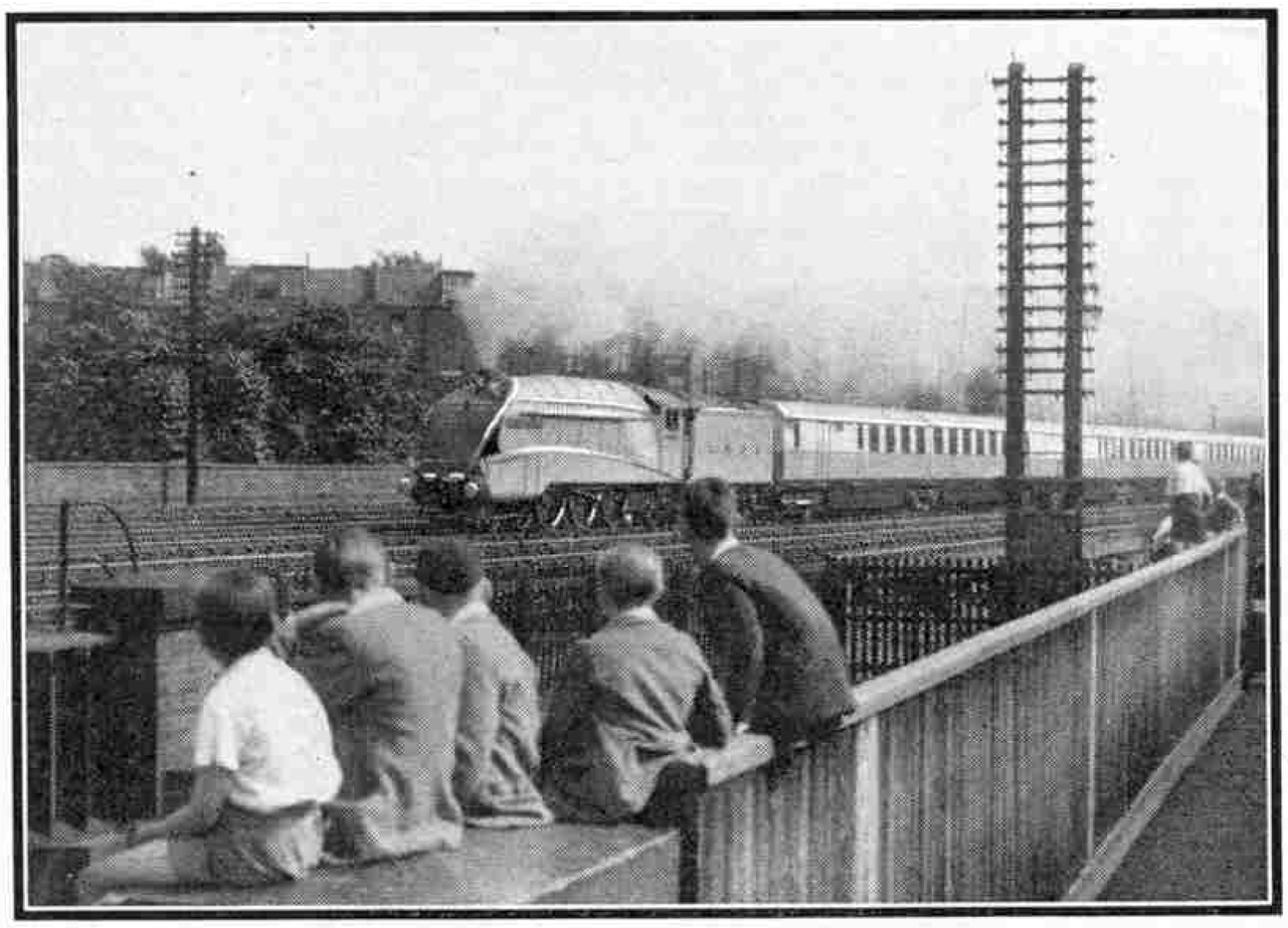
Join the Hornby Railway Company and become eligible for the competitions announced on this page.

READ THIS FIRST

This month we again include two main contests, one for the Senior Section members of the H.R.C. and the other for Junior Section members. The Senior Contest is open to all those members who are 12 years of age and over, and the Junior Contest to all members under 12 years. On no account must members of the Senior Section enter the Junior Section Contest or vice versa. The Railway Photographic Contest No. 5, which is announced at the bottom of this page of course is open to all H.R.C. members irrespective of sections.

Railway Scene Contest (Senior Section)

At this time of the year most H.R.C. members are enjoying their summer holidays, which usually involve journeys by rail. Even if no railway run is included, however, interesting railway scenes are sure to be noted, and for our contest this month therefore we invite Senior members to describe in not more than 250 words, *"The Most Interesting Railway Incident I saw During my Holidays."*



Entries in this contest must be written on one side of the paper only, and competitors should make sure that their name, full address and H.R.C. membership number appears on the back of each sheet submitted. Prizes consisting of Meccano products to the value of 15/–, 10/6 and 5/– respectively will be awarded in both the Home and Overseas Sections to the three members whose reports are considered by the judges to be the most interesting. In the case of a tie, general neatness and presentation coupled with the wording and phrasing of the account will be the deciding factors.

Envelopes containing entries should be marked *"H.R.C. Railway Incidents (Senior Section)"* and posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, on or before 31st August. The Overseas closing date is 30th November.

Word-Building Contest (Junior Section)

The L.N.E.R. train name *"Coronation"* is one of the most familiar train names in the world, and this month we are using it to form the basis of an interesting contest for Junior members. How many other words can you make up from the letters in this name? All the letters in the word can be used, but no letter must appear more often than it does in the key word.

Entries must be written on one side of the paper only, and the back of each sheet used must have on it the name, address and H.R.C. membership number of the competitor, also the total number of words found.

The contest will be divided into the usual two sections, Home and Overseas, and to the three competitors in each section who submit the longest list of words will be awarded prizes consisting of any products manufactured by Meccano Ltd. to the value of 15/–, 10/6 and 5/– respectively.

Envelopes containing entries must be marked in the top left-hand corner with the words *"H.R.C. August Word-Building Contest"* and underneath this *"Junior Section,"* and those submitted in the Home Section must be posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, on or before 31st August. The closing date is 30th November for receiving entries in the Overseas Section.

Railway Photographic Contest No. 5

The wide range of subjects submitted in the summer series of photographic contests shows that many interesting photographs would have been lost to us if competitors had been tied down to one definite subject. We therefore announce this month another photographic contest in which members may enter photographs of any railway subject. Each exposure must have been made by the competitor himself, although the actual developing may be the work of an expert.

The competitor may submit as many prints as he desires, but he cannot win more than one prize in one contest. It is important that each print sent in should have on the back a description in a few words of the railway scene shown, the age, name and address of the sender, and his H.R.C. membership number.

The contest will be divided as usual into two sections, Home and Overseas, and prizes of Hornby Train goods or any other Meccano products, or photographic material if preferred, to the value of 21/–, 15/– and 10/6 respectively will be awarded in order of merit to the senders of the three best photographs submitted in each section.

Envelopes containing prints should be marked *"H.R.C. Photo Contest No. 5"* in the top left-hand corner and posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, on or before 31st August. The closing date for Overseas entries is 30th November.

Solution
March Silhouettes Contest

S.R. 4–4–0 No. 1159; L.N.E.R. "A1" 4–6–2 No. 4470; L.M.S. 4–6–2 No. 6230; G.S.R. (I) 4–6–0 No. 401; L.N.E.R. "A4" 4–6–2 No. 4498; L.N.E.R. "B16" 4–6–0 No. 911; S. & D. 2–8–0 No. 90 (now L.M.S. No. 13810); L.M.S. 4–6–2 No. 6201; S.R. 4–4–0 No. 414; S.R. 4–6–0 No. 857; S.A.R. 2–10–4 No. 2551; L.M.S. 2–6–4T No. 2300: L.M.S. *"The Beetle"* Sentinel Locomotive; L.M.S. 4–6–0 No. 5666; L.N.E.R. 2–6–0 No. 3441; G.S.R. (I) 4–4–0 No. 321; L.N.E.R. 4–4–2 No. 3279; ex-M.R. 4–4–0 No. 2632; L.M.S. 4–4–0 No. 1163; L.M.S. 4–6–0 No. 5501.

H.R.C. COMPETITION RESULTS

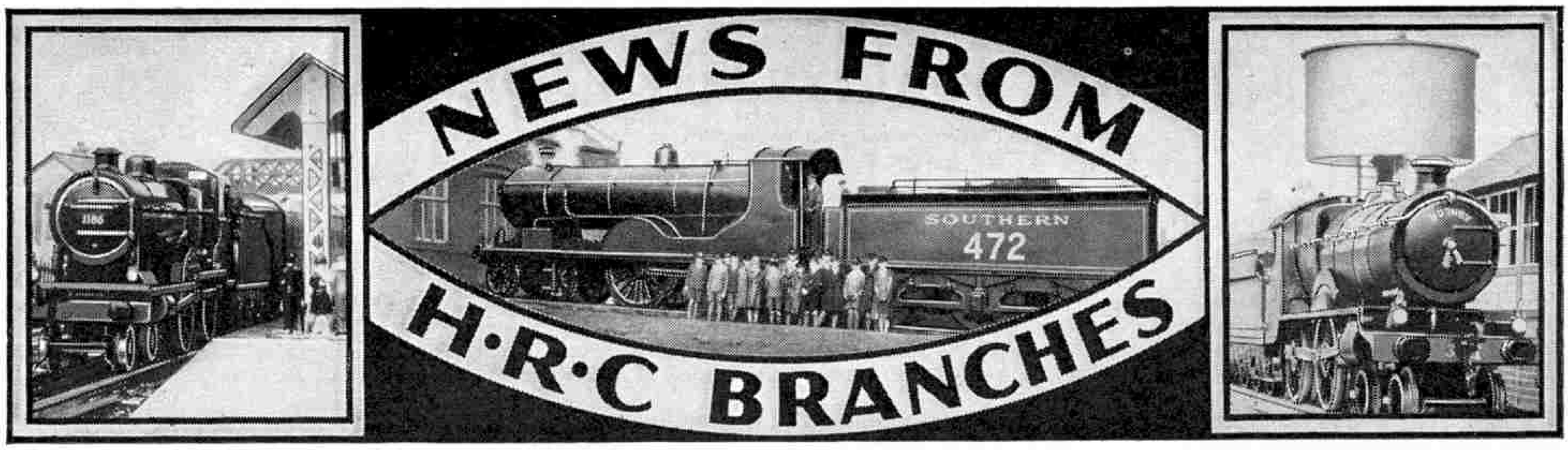
HOME

May "Photographic Contest No. 2."—First: J. Taylor (42922), Beckenham, Kent. Second: J. C. Button (10335), Crewe, Cheshire. Third: W. T. Tyler (59037), Worcester. Consolation Prizes: P. W. Malin (57340), London S.E.6; J. Turley (18853), Tunbridge Wells, Kent; A. Donaldson (6868), Belfast; D. F. Forbes (14092), Leith, Edinburgh 6; R. J. Wade (21087), Bentley, Hampshire; C. Spencer (44179), Sheffield 6.

May "Mystery Photograph Contest."—First: F. E. Sykes (47721), Huddersfield. Second: D. Coakham (28368), Upper Rathmines, Dublin. Third: G. Head (33088), Kidderminster. Consolation Prizes: F. Mills (31), Kearsley, Nr. Bolton; K. E. Milburn (26029), London E.4; H. G. Johnston (38784), Southall, Middlesex; B. R. J. Braund (46518), Saltash, Cornwall; K. Costain (5108), Bolton, Lancs.; C. E. Wrayford (6039), Bovey Tracey, Devon.

OVERSEAS

February "Voting Contest."—First: J. C. Williams (48397), North Island, New Zealand. Second: K. R. Cassells (39510), Wellington, New Zealand. Third: C. H. McKinnon (43363), New South Wales, Australia. Consolation Prizes: R. A. Wragg (7913), Rajputana, India; D. Murison (37642), Buenos Aires, South America; L. A. S. Johnson (53248), New South Wales, Australia; J. E. Ridgway (51742), Johannesburg, South Africa; R. Myburgh (37538), Cape Province, South Africa; J. C. Carter (46374), Capetown, South Africa.



WHITGIFT SCHOOL (CROYDON).—The 10th Annual Exhibition, held in conjunction with the Meccano Section, reflected the good progress made by the Branch this year. A Gauge 0 electric and clockwork layout with triple tracks was operated by members, and a Hornby-Dublo layout attracted special interest among the 300 visitors. The walls of the Branch room were decorated with suitable posters produced in the School Art Room. In the evening an L.M.S. film entitled *"Building a Corridor Coach"* was shown to an enthusiastic audience. A Visit has been paid to the S.R. Locomotive Depot at Stewarts Lane, Battersea. Arrangements are being made for a Visit to Betchworth lime quarries, where there is an extensive narrow gauge railway, and it is also hoped to visit the Romney, Hythe and Dymchurch Railway. Secretary: G. G. Caddy, 14, Culmington Road, South Croydon.

LEATHERHEAD.—A programme was drawn up at a meeting held to discuss arrangements for the Summer Session. At the regular Track Meetings train working has been carried out on a layout representing the East Scotland line of the L.M.S. Secretary: L. G. Lamden, Coveham, Fir Tree Road, Leatherhead, Surrey.

UPMINSTER.—Realistic track working has been carried out on the Branch layout, an innovation at one meeting being the running of the *"Atlantic Coast Express."* Part of the steel track constructed by members has been electrified. Frequent expresses have been run from "Waterloo," including holiday and excursion traffic to "Exeter" and "Bournemouth." The branch line has been extended and additional suburban services are now being run. Two new locomotives have been added to the Branch stud. Wooden stations are being constructed, notably a three-platform building for "Exeter." Secretary: E. R. Posselwhite, 68, Deyncourt Gardens, Upminster, Essex.

WHITECRAIGS (GLASGOW).—Several meetings were occupied with enthusiastic preparations for the Exhibition, which well repaid members' efforts. Visitors commented favourably on the display, and the net proceeds were nearly £2/10/–. The sidings on the layout have been relaid and new ballast provided. At Track Meetings Junior members are given practice in train control and railway procedure. A Debate on *"Road v. Rail"* found opinion evenly divided. Several cycle runs have been arranged. Secretary: A. T. Henderson, "Studley," Treemain Road, Whitecraigs, Glasgow.

CRAIGIE (PERTH).—Members were interested to learn that L.N.E.R. "Shire" locomotive No. 250 has been named *"Perthshire,"* as this also is the number of the Branch. The Branch has embarked on the construction of a model railway layout, with Hornby-Dublo equipment, to be laid on special trestles now under construction. Secretary: S. J. Hardman, 16, Priory Place, Craigie, Perth.

CRYPT SCHOOL (GLOUCESTER).—Alterations to the School building have restricted meetings, and most of the time has been spent out of doors. An outdoor layout is being constructed. A picnic on Painswick Beacon was thoroughly enjoyed. The Branch is arranging a display for the School Hobbies Exhibition. Secretary: M. D. Guilding, 33, Sandhurst Road, Gloucester.



W. C. Hill, secretary of St. Luke's (Battersea) H.R.C. Branch No. 368, Chairman, Mr. J. M. Lewis. This Branch was incorporated in March of this year and has made an excellent start. A good layout is being developed on which to carry out track operations to timetable. The Branch already has a magazine.

ST. STEPHENS (SALTASH).—Different layouts have been worked at Track Meetings, a variety of trains being run. Tennis is played on fine days, Table Tennis being substituted when weather conditions are not favourable. Secretary: A. J. Summerfield, Castle View Farm, Saltash.

LOSTOCK GRALAM (NORWICH).—Track Meetings have been held regularly and train running on Gauge 0 and 00 layouts has been keenly carried out. Arrangements for the Summer Session have included a discussion by the Photography Section on *"Spring Subjects,"* a topic inspired by an article in the March *"M.M."* A cinematograph film of members taken during a recent holiday was projected at one meeting, and further activity in this direction is planned. Excursions have been made to castles and churches for photographic purposes. Secretary: A. P. S. Milligan, Wincham Hall, Northwich, Cheshire.

FOLKESTONE.—There has been considerable activity on the Branch layout, a feature of traffic operations being the running of fast mail trains. Three stations have been provided with new posters. A locomotive shed has been built and painted an attractive white, and a realistic signal box has been made to present-day design. Further timetables have been drawn up. At the end of the Winter Session the layout was dismantled and thoroughly overhauled. Summer meetings have chiefly been in the open, and a model motor launch constructed by members has been tried out successfully. Secretary: F. E. Saunders, 79, Dover Road, Folkestone, Kent.

THE ABBEY (BURY ST. EDMUNDS).—Improved efficiency has been in evidence at Track Meetings, and express trains have been running right up to schedule. On the recent light evenings members have carried out operations on an outdoor layout owned by a member. Debates have been held on *"Electricity v. Gas,"* and *"Tourers or Saloons."* Secretary: M. D. Forster, 2, Crown Street, Bury St. Edmunds.

Proposed Branches

The following new Branches of the Hornby Railway Company are at present in process of formation, and any boys who are interested and desirous of linking up with this organisation should communicate with the promoters, whose names and addresses are given below.

BIRMINGHAM—C. J. Taylor, 20, Booth Street, Handsworth, Birmingham.
KING'S LYNN—C. Thomas, 28, Gloucester Road, Gaywood, King's Lynn.
LONDON—J. Clarke, 43, Cranmer Road, Forest Gate, E.7.
LONDON—A. Fox, 6a, Circus Road, St. John's Wood, N.W.8.
LONDON—Mr. W. G. Lanham, 30, Chillerton Road, Furzedown, S.W.17.
LONDON—S. Ross, 10, Guildford Place, Buff Place, Camberwell, S.E.5.
SOLIHULL—R. F. Burrows, "The Heath Bungalow," 59, Cornyx Lane, Solihull.
ROTHERHAM—J. Wilson, Brook Cottages, Whiston.

Branch Recently Incorporated

372. GLASGOW—Mrs. W. Baillie, 62, Westland Drive, Glasgow W.4.

The G.W.R. Weed-Killing Train

An Ingenious and Effective Unit

THE business of weed-killing is a more or less constant concern of readers who are amateur gardeners, and they will be interested to learn something of the efforts of the Great Western Railway in the same direction. In order to cope with weed growth on that system a special train forming a mobile spraying plant has been developed. With this train approximately 1,000 miles of track, mainly on branch lines where the motor trolley maintenance system is in operation, are treated every year with a solution consisting of a mixture of sodium chlorate and calcium chloride, a non-poisonous preparation that is deadly to weeds. This is supplied in a liquid form of the highest concentration at which it will remain in stable solution at normal temperature. It is delivered in rail tanks of about 2,000 gallons capacity, with special outlet for connection with the pump.

Experiments in chemical weed-killing started in 1932 and proceeded for some years before the present system was evolved. In the early days watering cans were used. Then spraying equipment was mounted on platelayers' trolleys, which were hauled by petrol trolleys or engines. Under this arrangement the pumps were geared to the axle and the solution was sprayed through jets; but as the mileage was necessarily small and the speed was limited to four or five miles per hour, much of the work could be carried out only on Sundays.

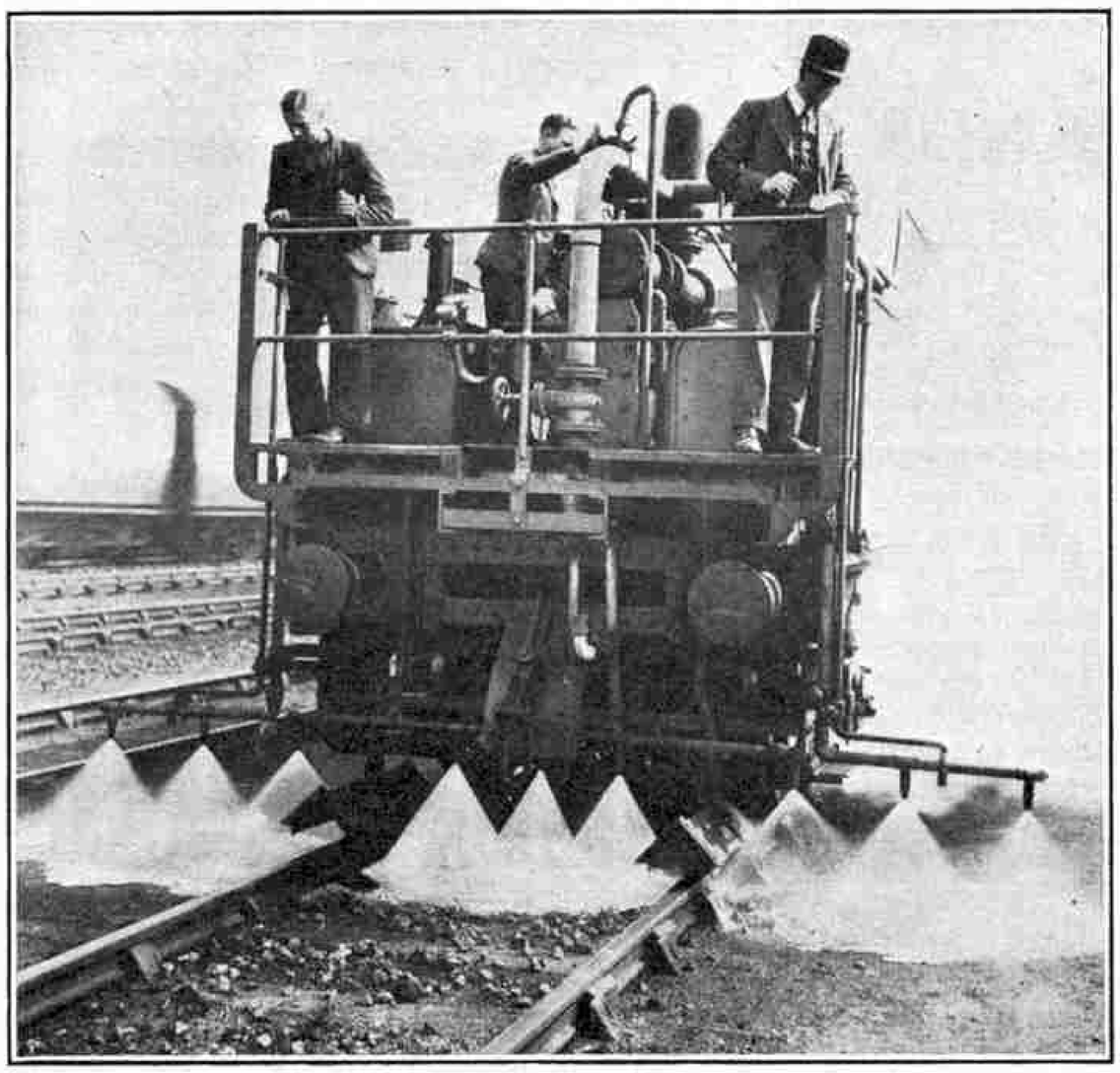
The most important outcome of the first experiments was that the principle of weed destruction by chemical spraying was found to be sound.

In 1935 it was decided to construct a train to have a spraying speed of 20 m.p.h., and a range at one filling of 25 miles. Three old locomotive tenders were fitted up, one as the spraying unit and the others as solution tanks, their combined capacity being 9,500 gallons of solution. All three tenders were connected with large-size armoured hose. These, with the tank of concentrate and the necessary brake van, make up the weed-killing train.

A single-action pump, operated by steam from the engine that hauls the train, forms the power unit for dealing with the liquids. It serves to pump either concentrated chemical from the supply tank to the solution tanks, or the mixture thus formed from the tanks to the nozzles for spraying at a pressure of from 40 lb. to 50 lb. per sq. in. In addition it can pump water from stream or ditch, if no other supply is available, for refilling.

One problem that arose was to ensure that the weed-killer should be mixed, and maintained during spraying, in the right proportion of water and chemical. When mixing, the operator is guided by an indicator on each tank showing the quantity of fluid inside. When a 5 to 1 solution is required he permits the water to reach the 2,500 gallon level on the indicator and then pumps in concentrated chemical until 3,000 gallons is registered.

To ensure that the solution is thoroughly mixed when the tanks are filled, and to keep it thoroughly mixed when the train is in action, a system of steam agitation has been introduced. This is effected by means of a pipe that is connected to the steam supply and laid along the bottom of the tenders. The pipe is perforated, so that the steam escapes into the liquid and causes an agitation that maintains a reliable mixture for spraying.



A close-up view of the G.W.R. weed-killing train in action, showing the disposition of the spraying nozzles and the rail shields.

The spraying nozzles are of a special type and are so constructed that the liquid is forced through them, under pressure, as a fine conical spray. There are nine nozzles fitted to the spray pipe; three are over the actual track and three are fixed to each of two swing arms that cover the cesses (drainage channels) at the sides of the track. With the swing arms the total spraying width is between 15 ft. and 16 ft. The arms are operated from the tender platform by a man on each side, who swings them in when necessary to clear signals, platform walls and similar obstructions. Cut-off valves are fitted so that if some part of the track or cesses does not need spraying the spray can be shut off at one or two of the sets of nozzles, with a proportionate economy of solution.

As it is essential for effective spraying that a speed of 20 m.p.h. should be maintained, a motor car speedometer, operated from the axles, is fitted to the spraying tender, and a system of code rings on an electric gong in the engine cab is used to indicate speed changes required. The train is so designed that it can run and spray in both directions.

The regular train crew consists of a fitter and his mate, an additional man being picked up in the district in which the train is working to assist with the swing arms. The regular men live on the train. Two folding beds are so arranged in the brake van that they can be put aside during the day; cooking and other facilities also are provided. Thus the train can move from district to district as the spraying programme progresses, without personal inconvenience to the crew.

As the work is carried out under a definite programme, it is possible to arrange for reserve tanks of concentrate to be available at the stations and depots where the train is scheduled to stay a night. The usual practice is to refill the train with solution at the end of the day's work and before the engine proceeds to shed, in order to ensure an early start the following morning. Filling operations take from 40 min. to an hour according to the nature of the water supply available. When the train leaves in the morning, surplus concentrate from the supply tank is taken with it, providing a refill on the journey.

The concentrate contains a glutinous substance that has been found to cause wheel-slip for trains following the spraying plant. To remedy this, rail shields with leather curtains on each side of the rail have been introduced; the curtains fall just below rail-level and, with the shields, prevent the solution from getting on the running surface.

The best time of the year for weed-killing is just before seeding takes place, in May and June; good results have been obtained in July, however, and even later. The chemical action on the weed growth takes place within 14 to 21 days after spraying, the exact period depending on the weather. Experience shows that grass is the most obstinate of all weeds; although the roots dry up there is sufficient life in the top growth to cause re-rooting. "Cat-tail" and columbine also are very troublesome, but successive growths become less robust until, after several seasons' spraying, they disappear.

At the present time about 500 miles of track are dealt with annually by the train, and 400 to 500 miles by trolley equipment. Under normal conditions the train can spray from 50 to 60 miles of track daily, some 400 gallons of solution being used per mile.

(This article is reprinted from the "Great Western Railway Magazine" by courtesy of the Editor.)

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STAMP COLLECTING

Scientists in the Stamp Album

HOW many readers have tried to build up a portrait gallery of scientists with the aid of stamps? The possibilities of such a scheme suggested themselves to us a day or two ago when we were looking over a packet of new issues that included the recent charity series from Danzig. Each of the three stamps in this series bears a portrait of a figure famous in medical science, Gregor Mendl (1822-1884) on the 10 pf. value, Robert Koch (1843-1910) on the 15 pf. and Wilhelm Konrad Röntgen (1845-1923), discoverer of X-rays on the 25 pf. As our illustration of the Röntgen stamp suggests, the designs are remarkably fine portraits and inevitably our thoughts commenced to drift over the names of other scientists whose work has been commemorated in stamp designs. Charles Darwin, Leonardo da Vinci, Marconi, Louis Pasteur, and Pierre and Marie Curie were names that came to mind immediately, and led us to make a search that revealed some 30 portraits that would comprise a most interesting "sideline" collection.



Such a collection would have to be properly "written up" to be attractive, but that would present no difficulty for collectors. The name and nationality, the date and place of birth, the date of death, and brief details of the outstanding achievements that brought him fame are all that is necessary for each subject. The date of issue of the stamp, perforation measurements, and purpose of the issue would suffice for the stamp itself, but more elaborate data



may be included if the collector desires. It should be remembered, however, that the same standard must be maintained right through the collection. It spoils things when "writing up" starts off elaborately and gradually tails off to bare data. We have in preparation an article on "writing up" that we hope to include in an early issue of the *"M.M.,"* and we will deal thoroughly with the problems of the subject in that article.

Coming now to the stamps themselves, we have already referred to Röntgen's portrait on a recent Danzig issue and to his discovery of X-rays. Wilhelm Konrad Röntgen was born at Lennep in Germany on 27th March 1845, and it was while experimenting at Wurzburg in 1895 with a vacuum tube wrapped in black paper that he discovered X-rays. To his surprise a screen coated with a chemical known as barium platinocyanide that happened to be near his tube glowed when the latter was in operation,



and he traced this to the effect of invisible rays that passed out of the tube through the glass and through the black paper. For his discovery Röntgen received the Gold Medal of the Royal Society in 1896 and the Nobel Prize for physics in 1901. He died on 10th February 1923.

The only English scientist in our gallery is Charles Darwin (1809-1882), the great naturalist whose ideas of the descent of man created heated controversies in the 19th century. Darwin's portrait appears on the 20c. value of the Ecuador series, which was issued in 1936 to commemorate the centenary of his visit to the Galapagos Islands in the Pacific Ocean, in the scientific survey ship *"Beagle"* in 1836. Darwin was only 22 when he secured the post of naturalist aboard the *"Beagle"* and his studies of plant and animal life, as observed during his voyaging up and down the Atlantic and Pacific Oceans and their coasts and islands, were the basis of his life work.



Probably the best known portrait in the collection will be that of the Marquis Guglielmo Marconi (1874-1937), the Irish-Italian inventor, whose work in the development of wireless communications gave "radio" to the world. Italy honoured Marconi and herself when in January 1938 she issued a short series of three stamps bearing his portrait. The design is illustrated on this page. Marconi was born at Bologna of Italian and Irish parents, and was only 22 when in 1896 he was successful in sending a wireless telegraph message over a distance of one mile. He took out his first patent in London in 1897.



Louis Pasteur occupies a foremost place among the world's benefactors. There are two portraits of Pasteur available for our collection. One is on the 1f. 50c. value of the charity series issued by France in November 1936 in aid of Unemployed Intellectuals. The other, illustrated here, is probably better known, for it was used on all values of France's 1923/26 general series.

Pasteur was born at Dole on 27th December 1822, and his career was one long triumph of outstanding discoveries. The value of his work was recognised in 1888 when an international subscription was raised to found an institute in Paris in which the work he began could be carried on for all time. To-day the Pasteur Institute is still the world centre for the study, cure and prevention of disease, and a worthy memorial to the great scientist. Pasteur died at Villeneuve L'Etang on 28th September 1895.



Pierre and Marie Curie rank next in importance among French scientists commemorated on stamps. Several portraits of them are available, for the 40th anniversary of their discovery of radium in 1898 was commemorated by stamp issues in France, in almost every French Colony, in Monaco, Cuba and Afghanistan. We illustrate the Afghanistan stamp, which shows the Curies in their laboratory. This is the same picture as that used for the French, French Colonial and Cuban stamps.

France also contributes a portrait of André Ampère (1775-1836) on the stamp issued on 27th February 1936 to commemorate the centenary of his death. Ampère's great work was in the field of electrical science and the ampère, the unit of electric current, is named after him. Another scientist in the electrical field was Count Alessandro Volta (1745-1827), whose portrait was used for the design of a series of four stamps issued by Italy in 1927 to mark the centenary of his death. The volt, the

(Continued on page 504)

Stamp Collecting (*Continued from page 503*)

unit of electrical energy, was named after him.

Italian issues provide several other portraits for our collection, the most famous being that of Leonardo da Vinci (1452-1519), scientist, inventor, sculptor, painter, and author, one of the outstanding geniuses of all time. He is shown on several Italian stamps, including the two high values of the series celebrating the Milan International Aeronautical Exhibition of 1935, and the three designs of the Dante Alighieri Society commemorative of 1932, one of which, the 1 L., is illustrated here. Leonardo was primarily an engineer and he devoted several years to the problem of flight. He was chiefly interested in machines with flapping wings, and left sketches of his devices, in one of which the pilot's feet are shown operating the wings.



Another famous Italian in our gallery is Luigi Galvani (1737-1798) whose portrait and autograph are the principal features of Italy's 1934 issue celebrating the First International Congress of Electro-Radio-Biology. Galvani's principal work was concerned with the force of electricity in muscular movement and it is commemorated in the words Galvanism and Galvanic current. Italy also gives us Antonio Pacinotti, one of the early experimenters with dynamos. His portrait appears on two stamps issued in 1934 to mark the 75th anniversary of the invention of his dynamo.

A specially interesting inclusion is the portrait of Dr. Fridtjof Nansen (1861-1930) that formed the design of the series of four stamps issued in December 1935 by Norway to raise funds to assist in carrying on the work of the Nansen office, an organisation founded by Dr. Nansen to assist international refugees. Dr. Nansen's early work was largely concerned with research on life in the Polar regions. Later he was appointed the first Norwegian Ambassador to London and from 1920 onwards he gave himself up to humanitarian work among prisoners of war, political refugees and victims of famine in Eastern Europe.



There is not space to list here all the portraits available for a scientist's stamp gallery. We think sufficient has been said to convince our readers that this topic would form the basis of a most fascinating little collection, and the Editor will send to any reader who applies to him a complete list of stamps that can be included.

We thank Stanley Gibbons Ltd. for their courtesy in loaning the stamps from which the illustrations for our stamp pages have been made.

Stamp Gossip

and Notes on New Issues

Western Samoan Jubilee Issue

By courtesy of the High Commissioner for New Zealand we are able to give advance reproductions of the four stamps to be issued by Western Samoa to commemorate the 25th anniversary of the occupation of the islands by New Zealand troops. The stamps are to be issued on 29th August, on which date 25 years ago the islands were surrendered to the New Zealand Expeditionary Force. They will remain on sale for three months.

The designs are as follows: 1d., Samoan coastal scenery; 1½d., a map of Western Samoa; 2½d., a dancing party in a Western Samoan Village; and 7d., a portrait of Robert Louis Stevenson, author of "Treasure Island," who established his home at Apia on Upolu in 1890. Stevenson did much to improve the lot of the natives and so far earned their affection that he was accorded the honour of a native name, *Tusitala* or the Teller of Tales. He died in December 1894 and was buried in a tomb on the summit of Mount Vale, which overshadows Apia.



Gibbons 1939 Catalogues

Nowadays stamp collecting is an all-the-year-through hobby, but nevertheless the news that the new catalogues are nearly ready still brings a thrill. This year the new Gibbons catalogues will be Stamp Centenary editions, and both the "Big" and "Simplified" volumes will be published on 31st August. The Whole World Volume of the "Big" catalogue will contain a special introductory article under the heading "A Centenary of Postage Stamps," and also a new Great Britain Key Table and explanatory notes on the Victorian issues. The "Simplified" edition will contain some 40 additional pages, making a total of 1,140.

The prices of the catalogues will be unaltered, 16/- for the "Big" whole world edition, and 5/- for the "Simplified."

An Antigua Error

A correspondent in "*Gibbons Stamp Monthly*" draws attention to a curious error in the view of English Harbour on the ½d. and 2d. values of Antigua's King George VI series, illustrated in the January "*M.M.*" The tree in the bottom left corner of the design, immediately above the letter "E" of "English" in the descriptive panel, is shown as a palm, a species that does not exist in Antigua.

New Dutch Commemoratives

The 1,200th anniversary of the death of St. Willibrord, the Apostle of the Frisians, has been celebrated in Holland by the issue of two commemorative stamps, which were issued on 15th June and will remain on sale for three months. The lower value, 5c., shows St. Willibrord landing at Katwijk, on the coast of Holland. The higher value, 12½c., shows a portrait of the saint in his vestments as Bishop of Utrecht and Archbishop of the Frisians, to which offices he was appointed by Pope Sergius I.



Holiday Treasure Hunts

The stamp collector who resolves to spend a part of his holiday hunting hidden treasures among the junk shops rarely receives the due reward of his exertions.

There are occasional lucky strikes still to be made, however, and "*Stamp Collecting*" tells of one such piece of good fortune that befell Mr. Herman Darewski, the well-known composer, during a recent stroll through the older part of Scarborough. He noticed a few stamps displayed among a medley of toys and models in a tiny shop window. From among those stamps he secured for the very modest sum of three shillings a specimen of the U.S. 1c. of 1851, which he values at £200, and a 24c. violet of the 1870 issue, catalogued at £90!

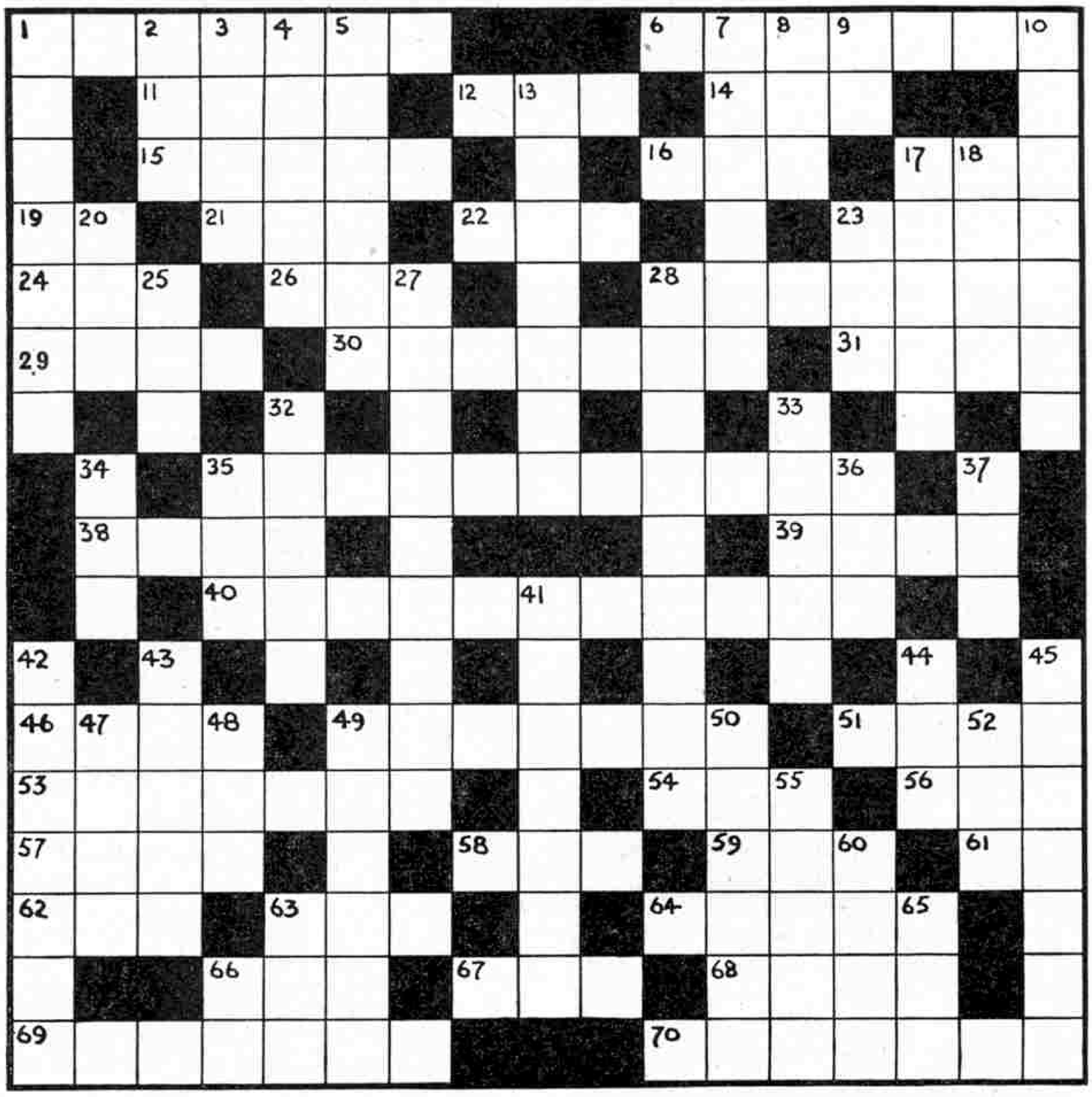
Belgian Charity Issue for Art

Belgium has issued a series of eight charity stamps to commemorate the tercentenary of the birth of the greatest of all Belgian painters, Rubens. Each of the designs takes the form of a miniature reproduction of one of the artist's most famous paintings, including "Chapeau de Paille," now housed in the National Gallery in London, and the revenue from the premium at which the stamps are sold is to be devoted to the cost of restoring Reuben's house at Antwerp and converting it into a national museum.



Competition Corner

August Crossword Puzzle



This month we give another of the popular "*M.M.*" crossword puzzles, and offer prizes of Meccano products to the value of 21/–, 15/–, 10/6 and 5/– in the Home and Overseas sections respectively for the four correct solutions that are neatest or most novel in presentation. Entries should be addressed "*August Crossword Puzzle*, Meccano Magazine, Binns Road, Liverpool 13," and must arrive not later than 31st August. Overseas closing date: 30th November.

CLUES ACROSS

1. Observed
6. Belonging to the ocean
11. Spoken
12. Peer into
14. Insect
15. Wheel-like
16. Conjunction
17. Bond
19. Preposition
21. Fuss over
22. Scamp
23. Step
24. Extreme point
26. Perceive
28. Comforter
29. Verve
30. An idle thinker
31. Season
35. With a common centre
38. Water fowl
39. Swelling
40. Evolution
46. Attempt
49. Delay
51. Steel instrument
53. Greet
54. Starting point
56. Retreat
57. All square
58. Request
59. Animal
61. Preposition
62. Colour
63. Fixed
64. Positions
66. Manner
67. Unusual
68. Valley
69. Railway worker
70. Revenue from property

CLUES DOWN

1. Excited
2. Hill
3. Harvest
4. Dislikes strongly
5. Exalted
7. Precentor
8. Finish
9. Proposition
10. Applauded
13. Search
17. Implied
18. Cooled
20. Greasy liquid
23. Tap
25. Trudge along
27. Wrong
28. Feeling
32. Recorded
33. Drying places
34. Deed
35. For carrying bricks
36. Slash
37. Prompt
41. Resisted
42. Affirms
43. Distributed
44. Offer
45. Flag
47. Possess
48. Cask
49. Strict
50. Mock
52. Sign of Zodiac
55. Consumed
60. Portable shelter
63. Rest
65. Ocean
66. Indefinite article

August Photo Contest

As announced in our April issue, we are running a series of photographic competitions each month throughout the summer. The conditions are very easy, the prizes being offered simply for the best photographs submitted each month. The only restrictions are that the exposure must be the work of the competitor and that each print must bear a title. Competitors may submit as many prints as they wish and they may be of any size.

Each month's entries will be divided into two sections, A for readers aged 16 and over, B for those under 16, and prizes of Meccano products or photographic material, as chosen by the winners, to the value of 21/– and 10/6 will be awarded in each section.

Entries to this month's contest must be addressed "*August Photo Contest*, Meccano Magazine, Binns Road, Liverpool 13," and must arrive not later than 31st August. Overseas closing date, 30th November.

Unsuccessful entries will be returned if a stamped cover is sent for the purpose.

COMPETITION RESULTS

HOME

June Photo Contest.—First Prizes: Section A, Miss D. A. Attrill (Bristol 1); Section B, J. Bury (Aberystwyth). Second Prizes: Section A, H. S. Holden (Abergele); Section B, C. B. Webb (Randalstown). Consolation Prizes: R. H. O. Benson (Manchester); W. C. Firth (London N.W.4); P. G. Lund (Leicester); J. E. Martin (Fishguard); C. A. Reader (London S.W.18).

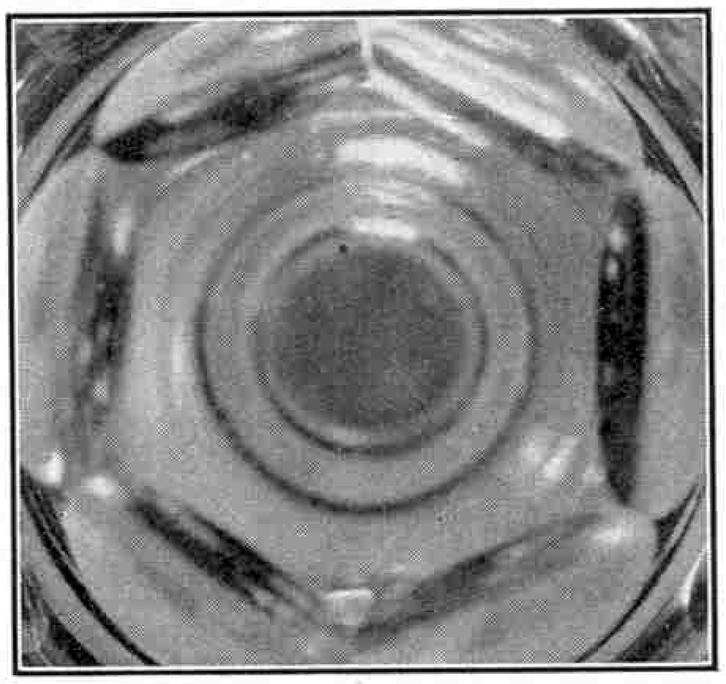
"Sketchograms" Contest.—First Prizes: Section A, E. J. Pearce (Portland, Dorset); Section B, B. Gillespie (Portrush). Second Prizes: Section A, E. F. Hill (Tettenhall); Section B, I. Hudspith (Croydon). Consolation Prizes: J. L. Carmel (Warrington); K. W. Hodgkinson (Liverpool 8); K. Ingles (London N.13); J. Jackson (Saltburn); D. T. Stott (Rochdale); P. R. Wickham (Leicester).

OVERSEAS

March Drawing Contest.—First Prizes: Section A, N. S. Collins (Sydney); Section B, J. Jolley (Capetown). Second Prizes: Section A, B. Mottram (New York); Section B, I. Juriss (Wellington, N.Z.).

"Car Faces" Voting Contest.—1. C. Donker (Rotterdam). 2. R. A. Wragg (Rajputana, India). 3. D. T. Taylor (Christchurch, N.Z.). 4. R. Julyan (Hong Kong). Consolation Prizes: C. Coleman (Buenos Aires); J. Geertsma (Leiden, Holland); T. A. Wade (Johannesburg).

WHAT IS IT?



This is the fifth of the series of six Mystery Pictures that commenced in the April "M.M." The picture represents a common object photographed in an unusual way, and competitors must send in their solutions to the picture on postcards marked "Mystery Picture No. 5" to arrive not later than 31st August.

New Meccano Products

An important addition to the range of Meccano Products is the fine Mechanised Army Outfit announced on the inside front cover of this issue. Nowadays all boys are keenly interested in the mechanised units of the British Army, and this splendid Outfit enables them to build up realistic models of tanks, anti-aircraft guns, field guns, transport lorries, etc. The Outfit contains a big assortment of specially designed parts finished in Service green and black, and a splendidly illustrated Manual of Instructions is included. Every boy who wishes to be up to date in his knowledge of British mechanised forces should have one of these Outfits.

On page iv is announced a notable addition to the Dinky Toys Series—the Boeing "Flying Fortress" (Dinky Toys No. 62g), one of the fastest bombers in the world, with a top speed of about 250 m.p.h. This type of bomber is used extensively by the United States Army Air Corps.

Attention is drawn also to the fine set of Saloon Cars (Dinky Toys No. 39), each beautifully enamelled in attractive colours. Included among them are the Lincoln "Zephyr" Coupé, which has a beautifully streamlined body of very advanced design, and the Packard "Super 8" Touring Sedan,one of the finest of American luxury cars. Other cars in the set are the Buick "Viceroy" Saloon, the Chrysler "Royal," the Oldsmobile "Six" Sedan, and the Studebaker "State Commander" Coupé.

Seaside Miniature Railways—

(*Continued from page 454*)

of the L.N.E.R. locomotive practice and has a most imposing appearance. Tank engines are rare in railways of this type, and on this account alone No. 4473 is notable.

An *"M.M."* reader, B. N. Cole of Edgbaston, sends us details of an interesting miniature railway in Scotland. This is at Ettrick Bay, at the north end of the Island of Bute. It was installed in 1936 under the supervision of the Rothesay Tramways Corporation, to which it belongs. The layout is solely for the amusement of children and is not operated over fare stages. The track has a gauge of 15 in., the rails being probably improvised from the tramlines that used to run from Rothesay to Ettrick Bay. A journey on this railway is quite exciting, particularly when passing through the tunnel, which serves a dual purpose. When the railway is not being operated it is used as an economical engine-and-carriage shed.

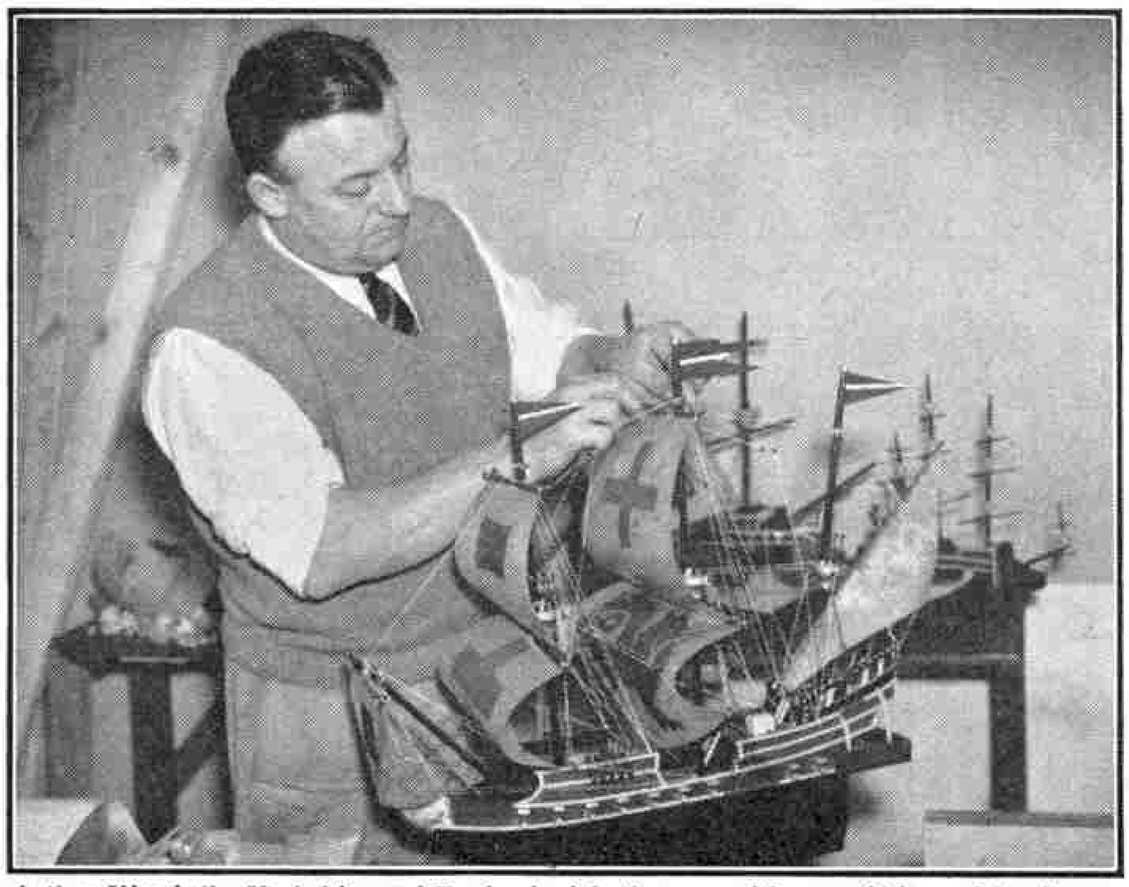
The 4–4–0 locomotive *"Samson"* was built by the Miniature Railway Corporation of Broadway, New York, and probably worked for some time in America before it was brought over to Scotland. That it is of American origin is made fairly obvious by the pilot or "cowcatcher." In addition its general design is reminiscent of the practice of early "American" designers, as 4–4–0s were long known in that country. It has a fire-tube boiler with a diameter of 16 in., working at a pressure of 130 lb. per sq. in. The diameter of the driving wheels is 10 in.

This engine, which is fitted with an eight-wheeled tender, is capable of a speed of 15 m.p.h. with the full load of four cars, each seating seven or eight people. The cars are of the four-wheeled type.

Holidays in County Down

The Belfast and County Down Railway have issued a pocket size guide for the benefit of those who set out to explore the holiday attractions of County Down, from Belfast in the North to Newcastle and the Mourne Mountains in the south. Everything that the holiday maker wants is to be found in the district covered, including seaside resorts, fishing villages, mountains and wild scenery of great attractions, with golf courses and other means of recreation; and all who are planning a holiday in the district should obtain a copy of the booklet.

Belfast, the starting point, is dealt with in outline first, and then the towns and villages on the shores of Belfast Lough, including Bangor, a favourite watering place, are described and illustrated. Bangor is the terminus of one of the two lines of the railway. The other and longer one leads southward to Newcastle, and has branches to Donaghadee and other places, the varied attractions of all of which are fully explained. Several pages are devoted to the Mourne Mountains, which are easily reached from Newcastle, and the peculiar fascination of these famous heights is described.



Arthur Wood, the Yorkshire and England wicketkeeper, with one of his model galleons. Constructing these models is Mr. Wood's hobby, and his eye is as keen in his craft work as when he is behind the stumps. His galleons are accurate in proportion and correct to the tiniest detail. Photograph by J. W. Overend, Bradford.

The booklet contains a good map of the system, with details of the accommodation available for visitors at Newcastle and Donaghadee. Copies can be obtained by writing to the General Manager's Office, The Belfast and County Down Railway, Queen's Quay, Belfast.

An American Best Seller

One of the interesting customs of the American toy trade is to take a nation-wide vote each year to determine the most popular of all the new season's toys, and our readers will be interested to know that the Skate-o-Meter, advertised on page xi of this issue, was amongst the first four in last season's voting.

The Skate-o-Meter is a simple wheel that can be fitted easily to all standard types of roller skates. It incorporates a mileage recording meter that shows the distance covered and thus adds greatly to the ordinary fun of roller skating.

The Skate-o-Meter can be obtained from most good toy and sports shops. Readers who are unable to find a local supplier should write to our advertisers, Millard Bros. Ltd., 467, Caledonian Road, London N.7, who will be glad to send a descriptive leaflet and the name of the nearest dealer who stocks the device.

"Valvespout" Force-Feed Oilers

Parker-Hale Ltd., makers of leakproof oilers, have sent us a copy of their new brochure describing the complete range of their gravity and force-feed oilers. The force-feed models are specially interesting, for the valve mechanism is housed in a pressure die-cast head formed in one piece with the handle. Readers who are interested can obtain a copy of the brochure from Parker-Hale Ltd., Whittall Street, Birmingham 4, free of charge.

Rearing Indian Moths as a Hobby

Readers who are looking for an unusual hobby would find it in rearing exotic moths. It is possible nowadays to buy the caterpillars of many varieties of huge and beautiful Indian moths and there is no difficulty in rearing them at home without heat. Our advertiser Mr. Pentland Hick, Athol House, Scarborough, will send a list describing the hobby, free of charge, to any *"M.M."* reader who applies for one.

A Real Motor Car in Miniature

The Atco Junior Safetyfirst Trainer, which is advertised in our pages for the first time this month, is a 1 h.p. motor car in miniature in which the controls of a full-size car are reproduced in a form suitable for boys and girls from 6 to 17 years of age. It has been introduced to meet the need for giving practical training in road traffic problems at an early age, and is by no means a toy, but a real motor car propelled by an Atco-Villiers 2-stroke engine using petroil, a mixture of petrol and oil in the proportions of 2 gal. to ¾ pt.

The car has forward and reverse gears controlled by a lever, and is complete with foot and hand brakes. It is steered by means of a wheel, just like a real car, and runs at a maximum speed of 8 to 10 m.p.h. It is narrow enough to be driven along garden paths, and practice with it is great fun as well as excellent training. An illustrated manual gives full instructions and explains the mechanism of the car in a simple manner.

The Atco Trainer is splendid also as a means of teaching road sense to boys and girls by demonstrations, for example in schools. Parents and schoolmasters will be particularly interested in it from this point of view, and they and other readers who are interested should write for an illustrated booklet giving fuller details, which can be obtained free from Charles H. Pugh, Whitworth Works, Birmingham 9. The *"M.M."* should be mentioned when writing.

The Bell Morse Transmitting Sets

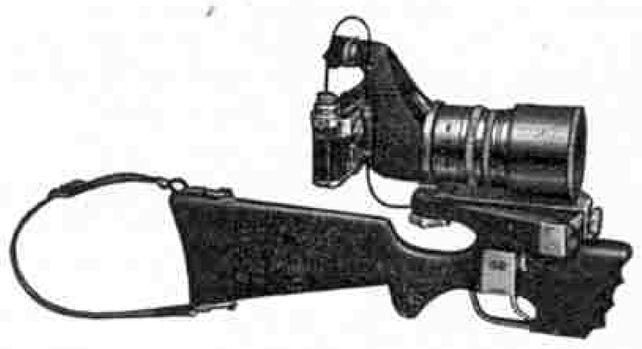
All boys who are keen on wireless telegraphy will be interested in the fine Morse transmitting sets advertised on page x. The set comprises two buzzers and two tapper keys packed in a strong wood box. On the lid of the box is a large-scale diagram showing how the apparatus is set up. The buzzers are designed for operation from a 4-volt pocket lamp battery, and are mounted on a stout moulded base. Each tapper key also is mounted on a moulded base, on which is engraved the complete Morse Code. Both buzzers and keys are fitted with screw adjustments.

The advertisers, Bell (Toys and Games) Ltd., Primus House, Willow Street, London E.C.2, will be glad to send full details to any reader who writes mentioning the *"M.M."*

Zeiss-Ikon Shoot their Pictures

The intriguing looking instrument in the accompanying illustration is not an unusual gun, but a new type of camera support in the form of a rifle-butt, designed by Zeiss Ikon Ltd. for use in sporting photography. It was tried out at the Olympic Games in Berlin three years ago and proved so successful—literally the photographers "shot" their pictures—that it is now a standard piece of equipment for all forms of high-speed work. The camera is sighted and "fired" just as one would use a gun, the shutter release being controlled by an ordinary trigger.

The camera mounted on the rifle butt is the famous Zeiss-Ikon Contax, fitted with one of 15 specially-designed interchangeable lenses that enable this camera to undertake work which ordinarily would call for the use of two or three special cameras. The lens normally used with the rifle butt has an aperture of f/2.8, which "stops" ultra-rapid movement even under bad lighting conditions, and gives a magnification of 3½ times as compared with the ordinary camera lens, thus providing a large image of the subject from a considerable distance, for instance, from a grandstand.



Other lenses for this camera enable instantaneous exposures to be given under the different lighting conditions prevailing in a theatre or a circus ring, while yet another, used for photographing animals and birds, gives a magnification of nearly 10 times as compared with the ordinary camera lens!

Zeiss Ikon also manufacture a splendid range of instruments suited to the needs of all purses, including box cameras from £1/–/– and folding roll film cameras from £2/12/6. All these cameras are described in a most interesting catalogue that is obtainable free on request from Zeiss Ikon Limited, Maidstone House, Berners Street, London W1. Readers are specially requested to mention the *"M.M."* when applying for a copy of this catalogue.



CRYSTAL CLEAR

Mr. Perks decided to give himself a present.

"I want a pair of spec-rimmed hornicles," he told the proprietor of the shop he entered. "I mean sporn-rimmed spectacles—er—I ought to say heck-rimmed spornacles."

"I know exactly what you mean," said the shop-keeper. "Mr. Johnson, show Mr. Perks some rimmed-horn hectacles."

* * * *

A professor was about to perform a chemical experiment before his class. "If I do anything wrong in this test," he explained, "we may all be blown through the roof. Kindly step a little closer, so that you can follow me better."

* * * *

POVERTY-STRICKEN



A tramp paused outside a large house, and as he did so another of his kind came shuffling out of the gate.

"Any luck, mate?" asked the first tramp.

"It ain't no use tryin' there," was the reply, "It's a poverty-stricken 'ole. There was a couple o' women tryin' to play on one blinkin' pianner."

* * * *

Tom: "Dad, I've got good news."

Dad: "Have you passed your examination?"

Tom: "Well, I didn't exactly pass, but I was top of those that failed."

* * * *

Teacher: "Can anyone tell me what causes trees to become petrified?"

Bright Student: "The wind makes them rock."

* * * *

Caller: "I would like to see the judge, please."

Secretary: "I'm sorry, sir, but he is at dinner."

Caller: "But, my man, my errand is important."

Secretary: "It can't be helped, sir, His Honour is at steak."

* * * *

A teacher was giving his class a lecture on charity.

"Willie," he said, "If I saw a boy beating a donkey, and I stopped him from doing so, what virtue should I be showing?"

"Brotherly love," said Willie.

* * * *

The dear old lady watched the gaily-clad cowboy dexterously swinging his lasso in the grounds of the circus.

"What a long rope," she said at last. "What do you use it for?"

"Waal, lady," the cowboy replied, "when I'm out West on the ranch I use it for catching cows."

"Catching cows? How very interesting. Tell me, what bait do you use."

* * * *

Orchestra Leader: "What key are you playing in?"

Pianist: "Skeleton key."

Leader: "Skeleton key?"

Pianist: "Yes—it fits anything."

* * * *

Old Gent: "You naughty boys! What are you doing to that poor fellow?"

Boy: "That's our referee. We're not hurting him. He's swallowed the whistle!"

THIS MONTH'S HOWLER

A refugee is a person who keeps order at a football match.

* * * *

Small Boy: "Daddy, will you sing, please?"

Father: "Certainly, my boy, but why do you want me to sing?"

Small Boy: "Well, Jimmy and I are playing ships, and we want a foghorn."

* * * *

Teacher (severely): "Do you know what becomes of boys who run away from school every afternoon to play football?"

Small Truant: "Some of 'em get into the big League clubs."

* * * *

An ex-Naval gunner's mate dozed off in front of the kitchen stove and let his evening paper fall against the red-hot bars.

"Fire!" exclaimed his startled wife, running into the room as the paper blazed up.

Waking with a start the gunner rammed the cat into the oven, slammed the door, and roared: "Ready, sir!"

* * * *

The engineer was interviewing an applicant for a job.

"You are an electrician?"

"Yes, sir."

"What is an armature?"

"Oh, he's a guy what works for nothing."

* * * *

Father: "Why are you bottom of your form this week, Harry?"

Harry: "Because the boy who is usually bottom has gone to the hospital."

* * * *

An Irishman obtained leave from work to attend a wedding. He returned with two black eyes.

The foreman asked him what had happened.

"When I got there," replied Pat, "I saw a fellow all dressed up like a peacock. 'An' who are you?' says I. 'I'm the best man,' says he, 'an' begorra, he was, too!'"

* * * *

Canadian Pen-Pal: "My brother was badly hurt by a revolving crane."

English Pen-Pal (in his reply): "Gosh! What fierce birds you have in Canada!"

* * * *

WRONG CONNECTION



"Hey, you!! Cut that whistlin' out, I've wasted half an hour oilin' me 'barrer'." (*Courtesy "L.M.S. Magazine."*)

A BARGAIN

"My, that was a big tip you gave the cloak-room attendant, Sandy."

"Ay, it was that, Jock, but look at the guid coat he gave me."

* * * *

Amiable victim (bowled over by accident): "I'm perfectly all right, thank you. I'm not a bit hurt."

Motorist: "I say you're behaving jolly well about it. It is a real pleasure to knock down a thorough sportsman like you."

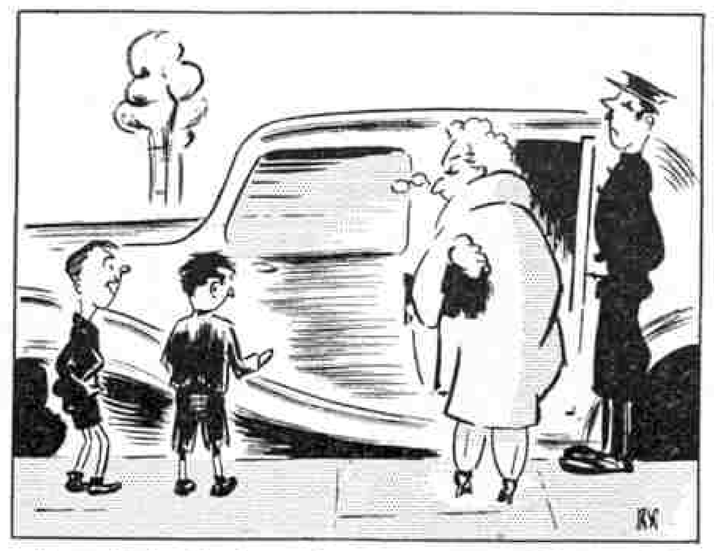
* * * *

Smith: "That car of Brown's is in a terrible state. He hasn't cleaned it for six months, I'm sure."

Jones: "Yes. The only time that car sees a hose is when the fire brigade passes."

* * * *

ONE OF THEM WRONG!



Two little Cockney boys were watching a lady, carrying a Pekinese, enter her luxurious car.

"What a nice little dawg!" exclaimed one of them.

"This is a *dog*, my boy, not a 'dawg'," corrected the lady.

"Sorry ma'am, but it looks like a *dawg* to me."

* * * *

Customer (angrily): "Those apples you sold me yesterday had a fishy taste."

Shopkeeper: "Quite right, madam. They were crab apples."

* * * *

Visiting Cricket Captain: "There's hardly a blade of grass to be seen on this pitch."

Groundsman: "Well, you haven't come to graze, have you?"

* * * *

Teacher: "What people are scattered all over the earth?"

Tommy: "Pedestrians, sir."

* * * *

Stranger: "Why did you swim ashore and leave your pal?"

Pat: "I had to save myself first. Now I'm going back to save Mike."

* * * *

Small boy (gazing from window): "It's raining, daddy."

Father (more interested in newspaper): "Oh let it rain."

Small boy: "I was going to, daddy."

* * * *

Old Lady: "Conductor, can I take this car to Green Street?"

Conductor: "No madam, I should get the sack if I lent it to anyone."

* * * *

Teacher: "Willie, you're late again, there's no excuse for it."

Willie: "No sir. I've been standing outside for 10 minutes trying to think of one."

* * * *

The Negro witness was being cross-examined about a former friend.

"Do you suggest he is a thief?" asked counsel.

"I don't say he's a thief, sah," replied the Negro, "but I do say dis. If I was a chicken, an' I saw him loafin' around, I'd sure roost high."

* * * *

Hairdresser: "Shall I give you a shampoo, sir?"

Mr. Newlyrich: "I can afford the best—a genuine poo or nothing at all."

BRYLCREEM

for Young Men who want to 'get on'

THE best man wins these days—and the young man who is always well-groomed and immaculate has a big start. Brylcreem sets your hair naturally without 'plastering' it down.

In bottles and tubes 1/-

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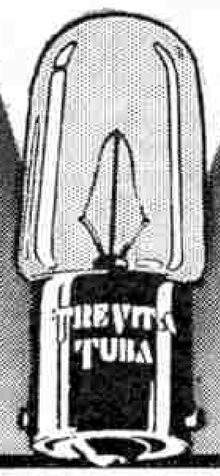
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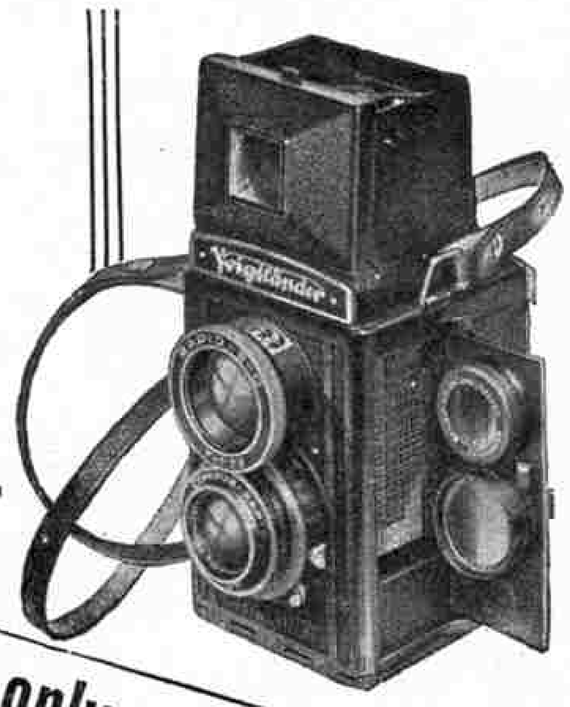
For use with BEMO 450, 452, 456, 460 Bulb Ref. 861
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For use with IMPEX 40.531. Bulb Ref. 853
For use with Lucifer 12 Pole Bulb Ref. 859
For use with Mandaw M1, M3, M5, M6, M7 Bulb Ref. 855



New Season's Catalogues will be available during August giving full details of the full range of all types of Tre Vita Super Vacuum Bulbs

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This camera makes focussing as easy as tuning a radio set . . .



and that's only one good point!

The Focussing Brilliant has a really unique principle of focussing—in the centre of the hooded finder is a matt disc and you focus the image on to this by turning the finder-lens. When the image is in correct focus—presto!—it springs to sharpness—just like the "knife-edge" tuning of a radio set. That's just an example of how well designed and well equipped this Focussing Brilliant is. Among its other advantages are automatic film winding and counting, built-in hold-all, yellow filter, the Brilliant exposure meter, two finders, strong plastic body and a genuine Voigtlander Anastigmat lens. It takes 12 pictures 2¼" square on standard 8 exposure 3¼"x2¼" film. Prices range from £10.10 with F/4.5 Voigtar lens to £16 with Heliar F/3.5 lens. Ask your dealer to demonstrate the Focussing Brilliant or write below for full details.

Schering Ltd. (Voigtlander Dept. 4), 185-192, High Holborn, London W.C.1

Voigtländer FOCUSSING BRILLIANT

★ OPTICAL CRAFTSMEN SINCE 1756 ★

OPTICAL CRAFTSMEN SINCE 1756

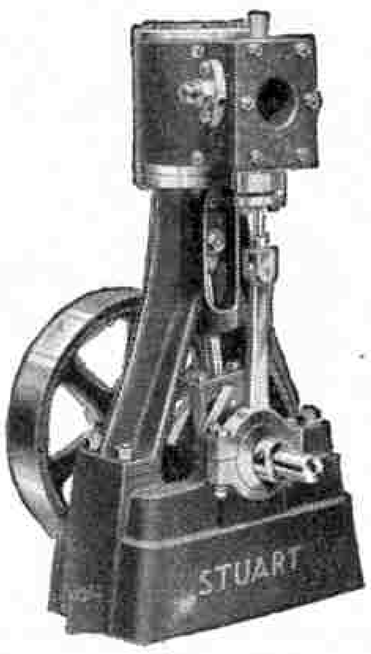
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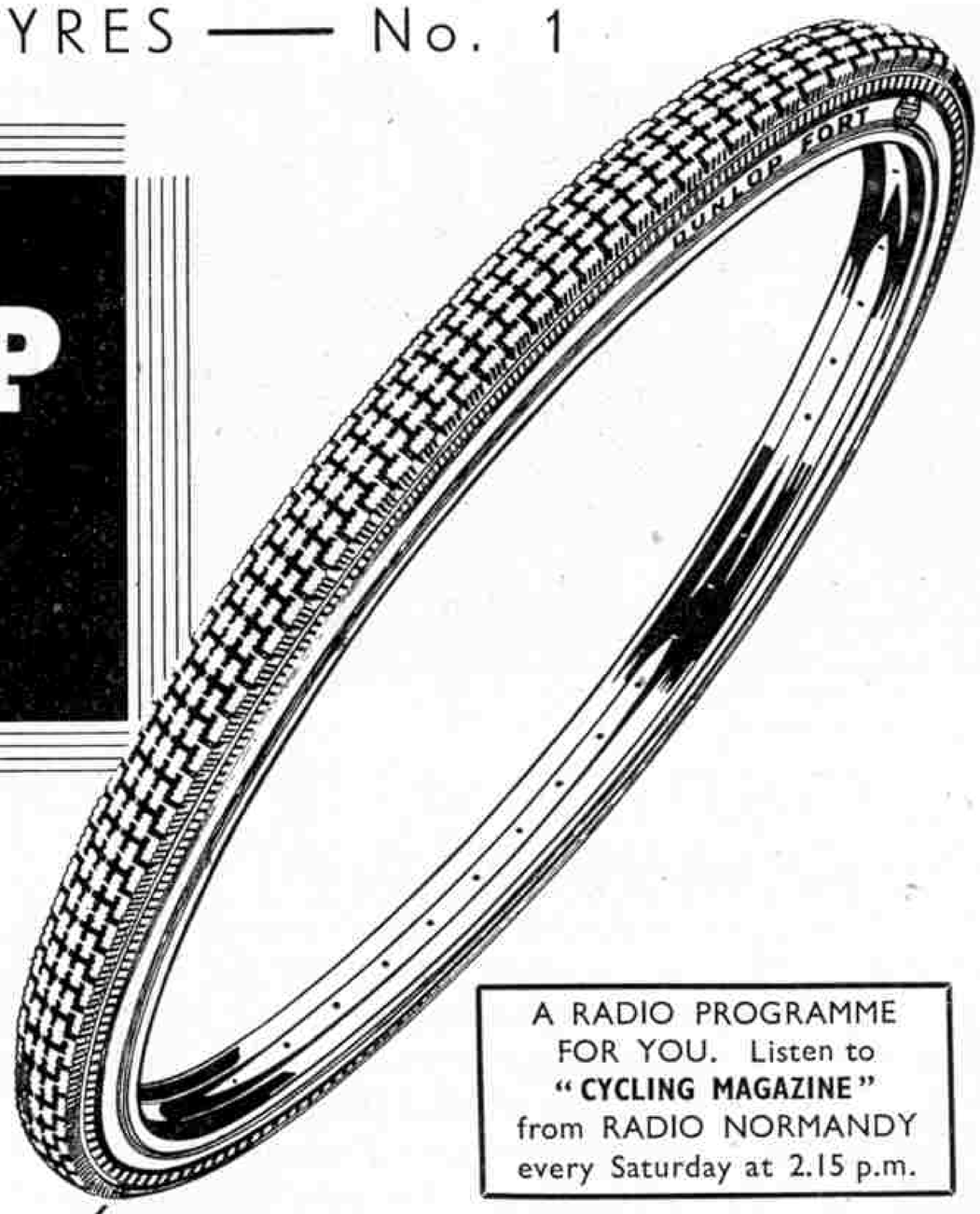
Point Setters ...	4/6 each	Signals ...	from 3/- each
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Negative by G. L. A. Blair, F.R.P.S. Exposure 1/100th sec. at f/11.

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How often do we see something interesting which we would like to share with an absent friend? With SELOchrome in your camera you can always be sure of securing the outstanding pictures your friends admire so much. SELOchrome is the *extra* fast film, orthochromatic, anti-halo backed and with plenty of latitude to allow for errors in exposure and to enable you to take vigorous snaps even in poor light.

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Taken with a 3¼" × 2¼" *Zeiss Ikon* Nettar Camera

ZEISS IKON

The Lambeth Walk

or, in fact, any other street presents numerous subjects for photography. It's not only the countryside that provides plenty of opportunities for artistic photography, as a walk round any city will show. But, of course, photography can be disappointing unless you use a good camera—the sort, for example, made by Zeiss Ikon, with which excellent results are so easily obtained.



Zeiss Ikon cameras, although famous for their quality, can cost as little as £1. The BOX TENGOR is a fine example of the inexpensive Zeiss Ikon range. It gives 8 pictures 3¼" × 2¼" on the usual spool and the illustration gives some idea of its fine lines and handsome finish. It embodies all the latest innovations in box camera design, including a device to prevent unintentional double exposures, so that even if you do forget to wind on the film you cannot spoil your picture by making two shots on one section of the film.

The box TENGOR is equipped with a Frontar f/11 lens. Supplementary lenses are included to deal with close-up portraits, and groups, price £1/12/6.

Other box models from £1/–/–.

Folding roll film models from £2/12/6.

. . . and here's a special offer—

A new 64 page text book by Henry G. Russell, A.R.P.S. (known to thousands of keen amateur photographers as "Minicam") which gives a fresh aspect on things photographic. It is entitled: "Common-sense Photography" and although published at 1/–, a copy can be obtained *entirely free of charge*. For further particulars of this unique offer (applicable only in U.K.), and a copy of the new 40 page Zeiss Ikon art catalogue: "If only I had my camera!" post coupon below at once (½d. *stamp if unsealed*).

To **Zeiss Ikon Ltd.,**

46, Maidstone House, Berners St., W.1

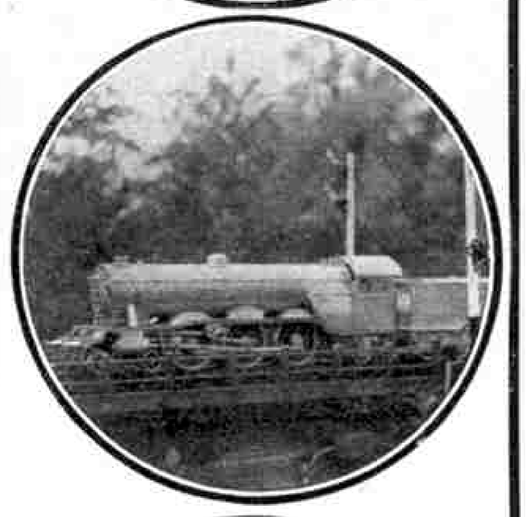
Please send me the Zeiss Ikon Catalogue and particulars of how I can obtain a free copy of "Common-sense Photography."

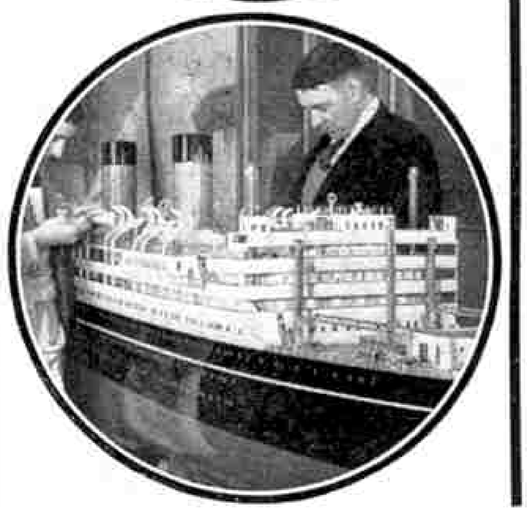
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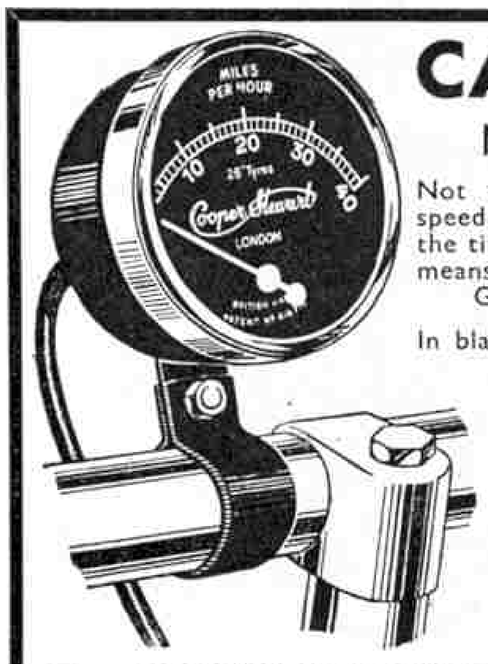


BINDING THE "M.M."

Binding cases for back numbers of the Magazine may be obtained from Messrs. O. H. Bateman and Co., 23, Hanover Street, Liverpool. These are supplied in two sizes (1) for six copies price 3/3 and (2) for twelve copies price 4/9, post free in each case. The binding cases are supplied in what is known as "Quarter Basil, full cloth." They are tastefully embossed in gold with the name "Meccano Magazine," and on the back is the name and volume number.

Binding 6 and 12 copies. These binding cases are supplied so that readers may have their Magazines bound locally, but where desired, the firm mentioned above will bind Meccano Magazines at a charge of 5/9 for six issues or 7/6 for twelve issues, including the cost of the binding and also return carriage. The covers of the Magazines may be included or omitted as required, but in the absence of any instructions to the contrary they will be included.

Whilst the binding of the twelve Magazines is quite satisfactory, they form a rather bulky volume and for that reason arrangements have been made to bind six months' Magazines where so desired, as explained above.



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M.P.H. ON YOUR CYCLE?

Not only is it more fun, with a C-S cycle speedometer, but you can suit your speed to the time you're due to arrive. A steady 15 m.p.h. means 5 miles in 20 mins. Doubles your pleasure. Get a Cooper-Stewart for real accuracy.

In black and chromium, with handlebar clip and easily fitted to any cycle.

Model C1 (Fits either side of wheel) **12/6** complete

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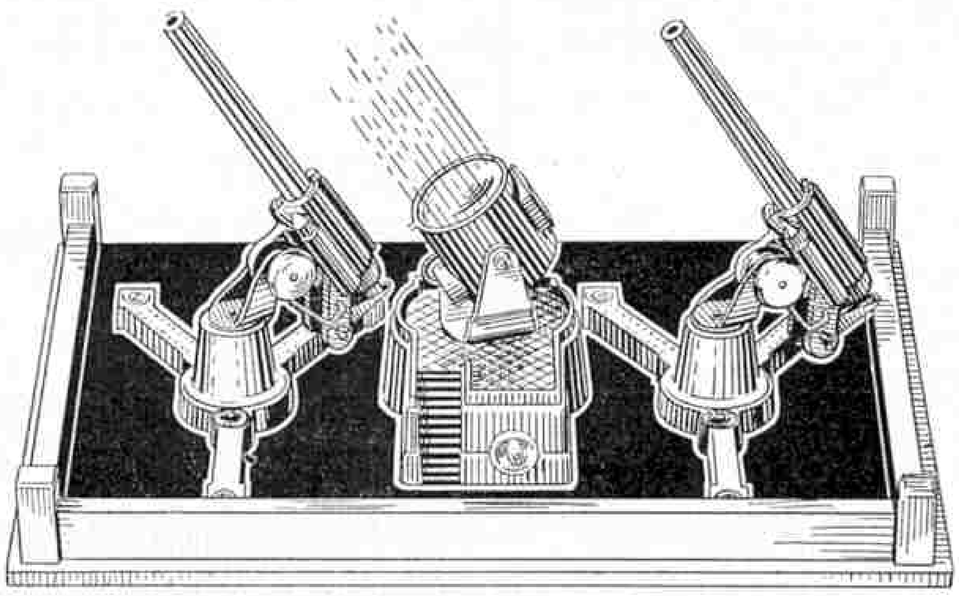
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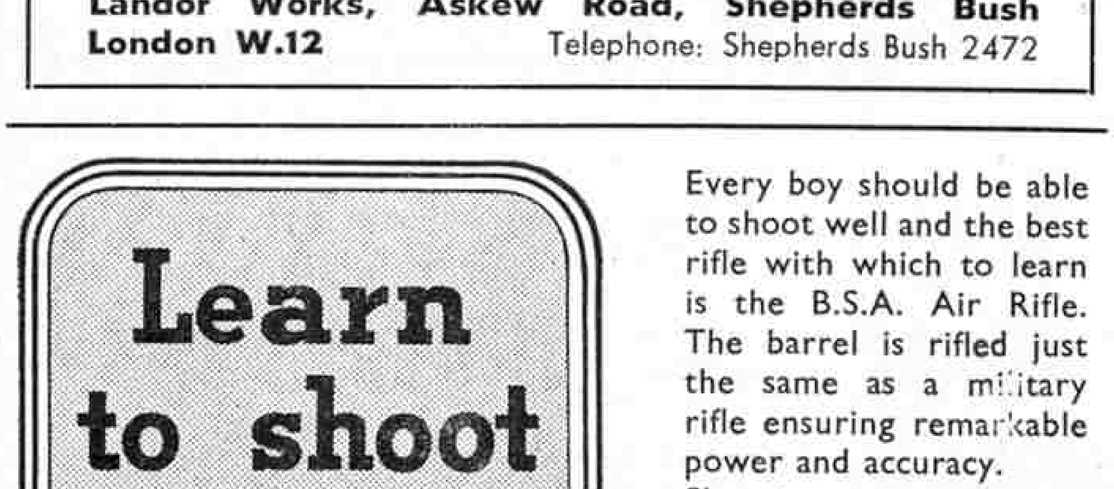
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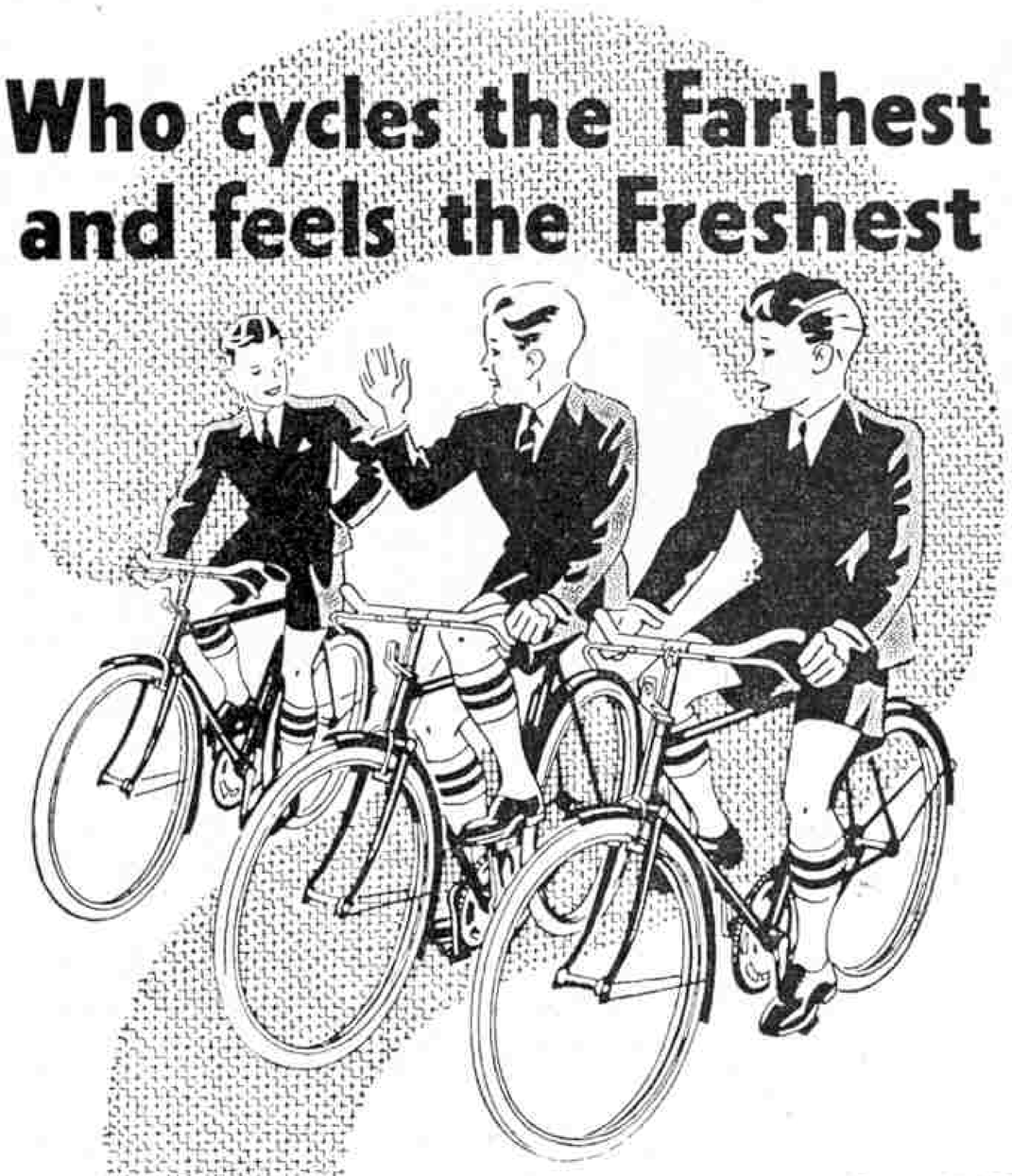


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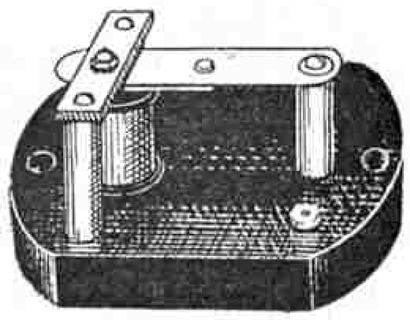
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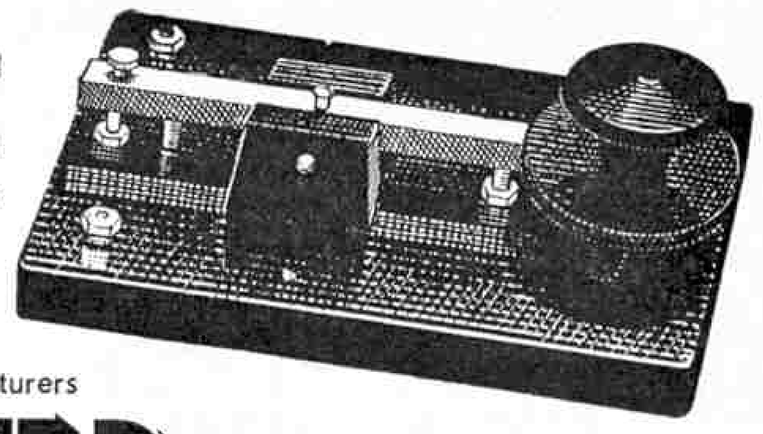
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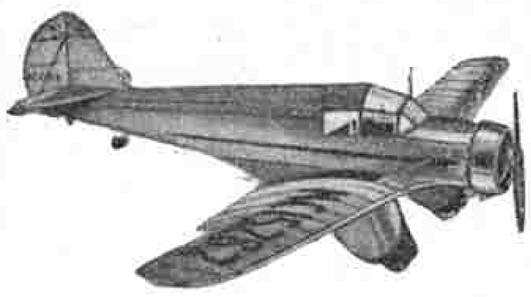


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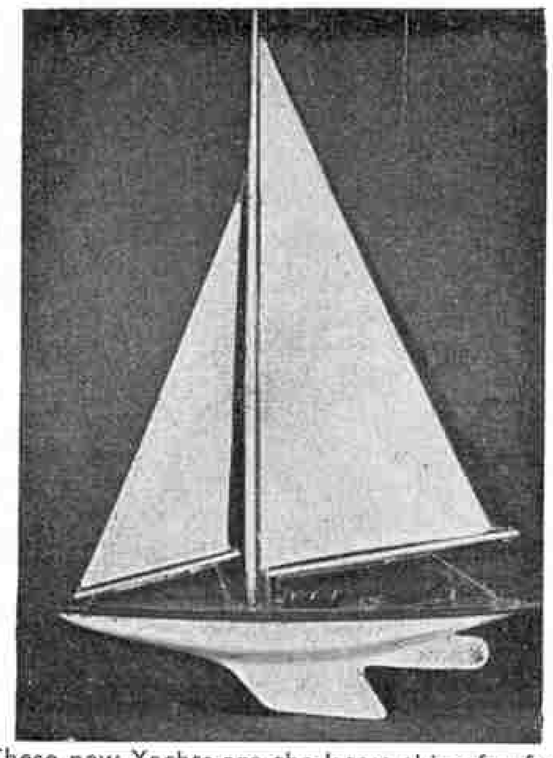
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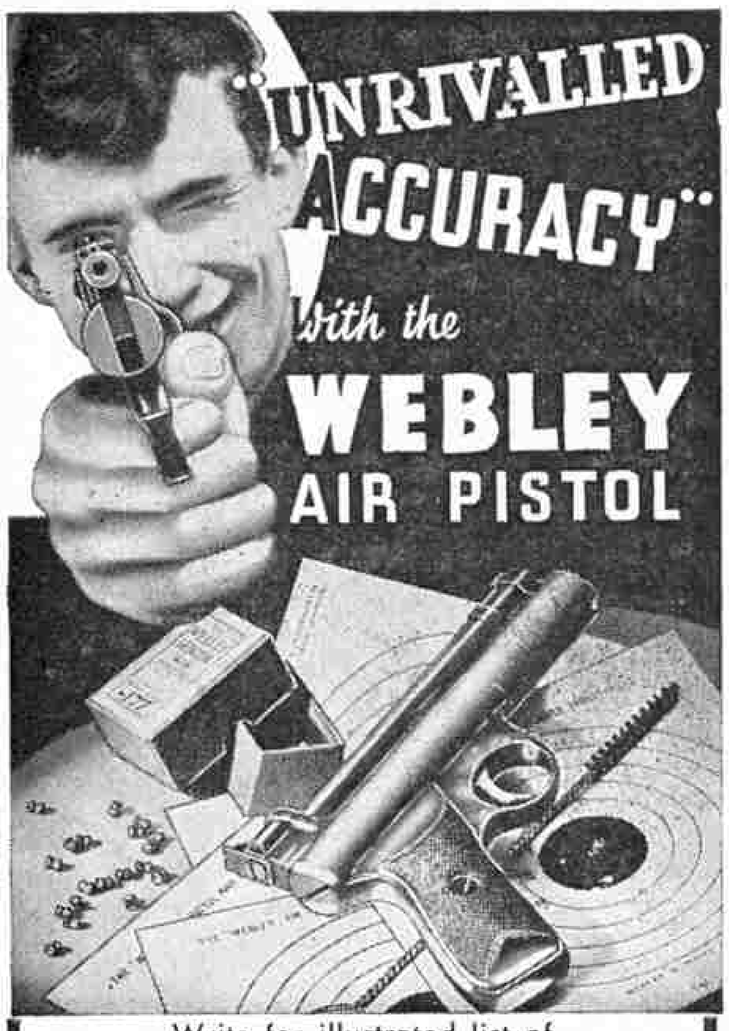
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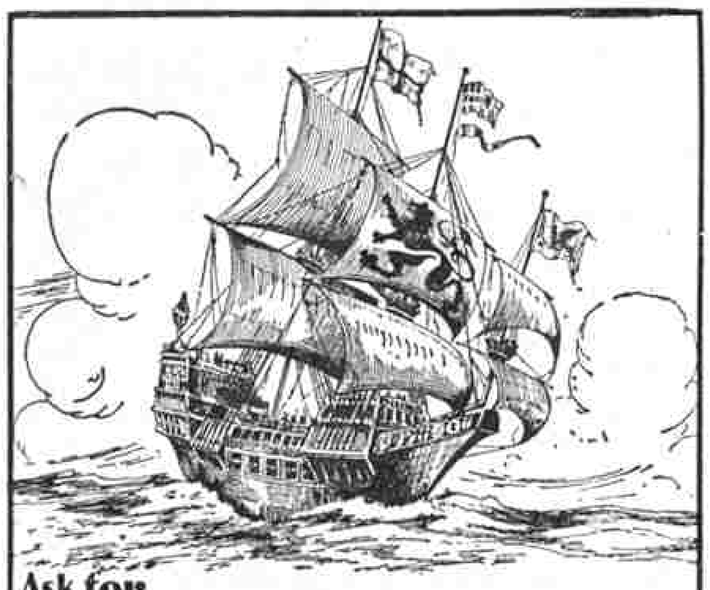


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READERS' SALES AND WANTS

Readers should note that all advertisements of Hornby Trains and other Meccano products included in this column relate to items no longer featured in the catalogue. Advertisements of current products cannot be accepted for this column.

350 Red-Green Meccano parts, 25/- or nearest.—Ogilvie, "Ashbury," Weald Road, Sevenoaks.

Horizontal Steam Engine, bore 1½", stroke 1½", with riveted copper boiler, central draught tube, safety valve, pressure and water gauges, fire door, drain cocks, force pump connection, tested 60 lbs. per sq. inch. Height with chimney about 20". Carriage paid 60/-.—Box No. 801.

Sale. Soho Pilot Camera, 3¼"×2¼", and Case. Cost 17/9. 10/- or offer.—Richards, Redcroft, London Road, Nantwich, Cheshire.

£20 worth Red-Green Meccano, including Clockwork and Electric Motors. List on application. £10 or offer.—Annable, 46, Benslow Rise, Hitchin.

For Sale. B.S.A. 45/- Air Gun, bore perfect, 30/-. £6 Red-Green Meccano, £2. First 19 "William" Books by Richmal Crompton, 1/- each, 17/6 lot. All good condition.—R. D. Dean, 30, South Park Road, Wimbledon, S.W.19.

For Sale. Lott's Chemistry Set, Student's Cabinet, almost unused, cost £4, will accept £2/10/- or near offer.—Jones, 21, Birmingham Road, Kidderminster.

Wanted. September and October 1935, October and November 1936 "M.M.'s." Perfect condition essential. Write, stating price to—Box No. 802.

Sale. Clockwork Railway. Cost £4/5/-. Take £2/10/-. 25/- Lott's Bricks, 14/-, all good condition. Stamp for details.—Elliott, Kirkby Road, Ripon, Yorks.

For Sale. 42 in. Racing Schooner, Yellow Pine hull and deck, Bassett Lowke fittings. Almost new, £7, nearest.—S. Barton, 7, Avondale Road, Luton, Beds.

"Meccano Magazines," February 1934 to June 1939 (March 1936 missing), 10/- or nearest offer.—Box No. 803.

Sale. Loose-leaf Album with 1,400 Stamps, new, £1. Stamp for list bargains.—Gilchrist, 30, Clincart Hill, Rutherglen.

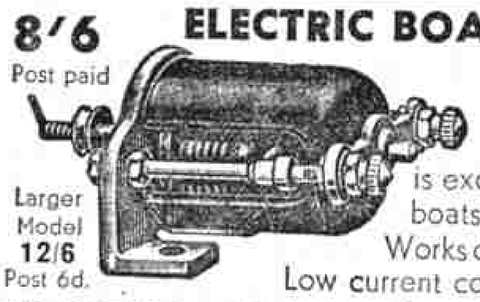
For Sale. Adana Printing Machine and extra large stock of type. Also "Meccano Magazines" and "Scouts," 1927-1936. Send stamp for particulars.—Dinnie, 12, Westonlee Terrace, Dumbarton.

Sale. Gauge 0 Track, Rolling Stock, etc. Particulars—Balfour, 13, Ashburnham Gardens, Upminster, Essex.

Sale. Gauge 0 Clockwork Trains. Worth £12. 30 Wagons, 108 Rails, 17 Points, Accessories. Sell separately. Carriage paid. What offers?—Cook, 116, Wards Hill, Minster, Sheerness.

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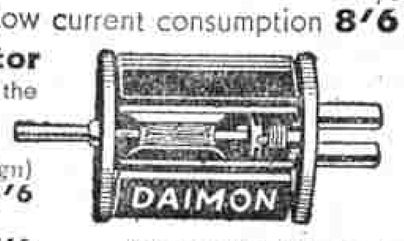
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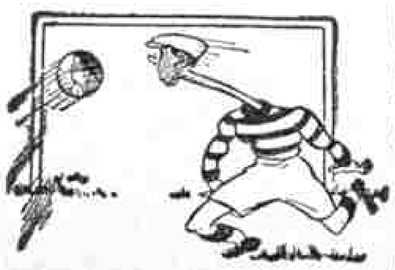


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EDITORIAL AND ADVERTISING OFFICE:—

LIVERPOOL 13, ENGLAND.

Telegrams: "Meccano, Liverpool."

Publication Date. The "*M.M.*" is published on the 1st of each month and may be ordered from any Meccano dealer, or from any bookstall or newsagent, price 6d. per copy. It will be mailed direct from this office, 4/- for six issues and 8/- for twelve issues.

To Contributors. The Editor will consider articles and photographs of general interest and payment will be made for those published. Whilst every care will be taken of articles, etc., submitted, the Editor cannot accept responsibility for any loss or damage. A stamped addressed envelope of the requisite size should be sent where the contribution is to be returned if unacceptable.

Readers' Sales and Wants. Private advertisements (i.e., not trade) are charged 1d. per word, minimum 1/-. Cash with order. Editorial and Advertising matters should not be dealt with on the same sheet of paper.

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Display. Quotations for space bookings, and latest net sale figures, will be sent on request.

Press Day, etc. Copy should be sent as early in the month as possible for insertion in following issue. We usually close for press on or before 6th of each month for following issue. Half-tone blocks up to 100 screen.

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Remittances. Postal Orders and Cheques should be made payable to Meccano Ltd.

Ordering the "M.M." Overseas

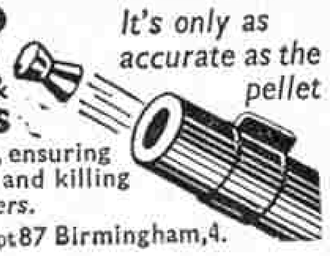
Readers Overseas and in foreign countries may order the "*Meccano Magazine*" from regular Meccano dealers or direct from this office. The price and subscription rates are as above, except in the cases of Australia, where the price is 1/2 per copy (postage extra), and the subscription rates 8/- for six months and 16/- for 12 months (post free), Canada, where the price is 10c. per copy, and the subscription rates 65c. for six months, and $1.25 for 12 months (post paid).

The U.S.A. price is 15c. per copy, and the subscription rates $1 and $2 for 6 and 12 months respectively (post free).

Overseas readers are reminded that the prices shown throughout the "*M.M.*" are those relating to the United Kingdom and Northern Ireland. Current Overseas Price Lists of Meccano Products will be mailed free on request to any of the undermentioned agencies. Prices of other goods advertised may be obtained direct from the firms concerned.

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A sturdy tank engine with a "mixed goods" train of fascinating variety and realism.

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AHOY THERE, BOYS!.....



These are Hornby Speed Boat Days

Model speed boat racing is one of the most thrilling hobbies you can have, brimful of excitement from start to finish. But the amount of fun you get depends on the kind of boat that flies your colours. That's why you'll be proud to own a Hornby—every inch a champion, sleek, smart and swift. A winner against all comers!

HORNBY SPEED BOATS

When other boats are slowing up, the Hornby Speed Boats are still going strong. The special design of the propeller and the unique methods employed in the construction of the hull give each model exceptional speed and length of run.

These fine boats are built with the same precision and craftsmanship as the famous Hornby Trains. You will be amazed at their outstanding performance—the No. 3 Speed Boat does a snappy run of over 500 feet on one winding!

HORNBY RACING BOATS

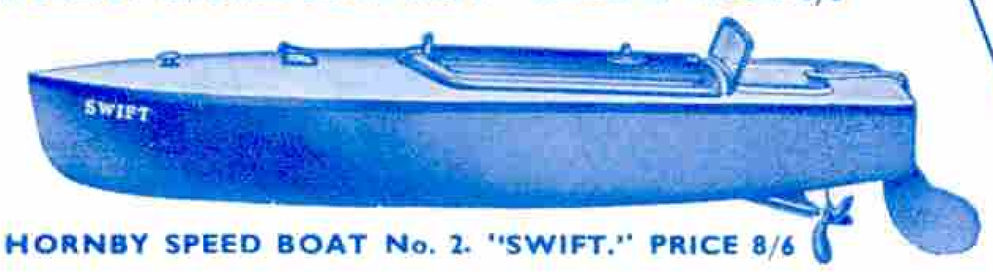
The series of Hornby Racing Boats is composed of three exceptionally fine models that are "quick off the mark," and which maintain a high rate of speed throughout the whole length of their run. Their remarkable performance, perfect design and beautiful appearance have already gained for them a unique popularity among boys.



HORNBY SPEED BOAT No. 1. "HAWK."
PRICE 2/11



HORNBY RACING BOAT No. 1. "RACER I." PRICE 5/6



HORNBY SPEED BOAT No. 2. "SWIFT." PRICE 8/6



HORNBY RACING BOAT No. 3. "RACER III."
PRICE 15/6



HORNBY LIMOUSINE BOAT No. 4. "VENTURE."
PRICE 17/6

PRICE LIST

HORNBY SPEED BOATS

HORNBY SPEED BOAT No. 1. "HAWK"	Price **2/11**
HORNBY SPEED BOAT No. 2. "SWIFT"...	Price **8/6**
HORNBY SPEED BOAT No. 3. "CONDOR," "GANNET" or "CURLEW"	Price **14/-**
HORNBY LIMOUSINE BOAT No. 4. "VENTURE" ...	Price **17/6**
HORNBY CABIN CRUISER No. 5. "VIKING" ...	Price **18/6**

HORNBY RACING BOATS

HORNBY RACING BOAT No. 1. "RACER I" ...	Price **5/6**
HORNBY RACING BOAT No. 2. "RACER II" ...	Price **9/6**
HORNBY RACING BOAT No. 3. "RACER III" ...	Price **15/6**

HORNBY WATER TOY

HORNBY WATER TOY (DUCK)	Price **2/6**

Manufactured by
MECCANO LTD., BINNS ROAD, LIVERPOOL 13

HORNBY SPEED BOATS

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